Health Canada Santé Canada

April 2002

HIV AIDS

EPI Updates

Canada

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Information to the readers of HIV/AIDS *Epi Updates*

The Division of HIV/AIDS Epidemiology and Surveillance of the Centre for Infectious Disease Prevention and Control, Population and Public Health Branch, Health Canada, is pleased to provide you with the April 2002 publication of HIV/AIDS *Epi Updates*.

As part of its mandate, the Centre conducts national surveillance and research on the epidemiology and laboratory science related to HIV/AIDS and other sexually transmitted diseases. As part of this mandate, *Epi Updates* are compiled to summarize recent trends and developments related to the HIV epidemic in Canada.

This publication includes one new *Epi Update* on older Canadians and a number of *Epi Updates* that have been updated for April 2002. All *Epi Updates* are available at the address noted above and also at our website: www.hc-sc.gc.ca/hpb/lcdc/bah.

The HIV/AIDS *Epi Updates* are complementary to other Centre materials which are also available at the website.

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April 2002

HIV/AIDS EPI UPDATE

Centre for the Infectious Disease Prevention and Control

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HIV/AIDS
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At a Glance

- **An estimated 4,190 persons in Canada were newly infected with HIV in 1999.**
- **From 1996 to 1999, there was a 30% rise in incident HIV infections among MSM and 27% drop among IDU.**
- **An estimated 49,800 people in Canada were living with HIV (including AIDS) at the end of 1999.**
- **There was a 24% increase in prevalent infections from 1996 to 1999.**

CIDPC Website:
www.hc-sc.gc.ca/hpb/lcdc/bah

National HIV Prevalence and Incidence Estimates for 1999: No Evidence of a Decline in Overall Incidence

Introduction

This report outlines estimates of the total number of Canadians who were living with HIV infection at the end of 1999 **(prevalence)** and the number of individuals who became newly infected in 1999 **(incidence)**. Producing national estimates of HIV prevalence and incidence are an integral part of the work of the Centre for Infectious Disease Prevention and Control. They are used as a tool to monitor the HIV epidemic, to help evaluate and guide prevention efforts, and are part of on-going risk assessment and management work conducted by the Centre. It is anticipated that the next set of national estimates will pertain to the year 2002 and will be produced during 2003.

Methods

HIV prevalence and incidence estimates at the national level are estimated by a combination of different methods using data from a wide variety of sources, such as AIDS case reports, provincial HIV testing databases, population-based surveys, targeted epidemiological studies and census data.

Prevalence and incidence estimates are derived separately for the following exposure categories: men who have sex with men (MSM), injecting drug users (IDU), MSM-IDU, heterosexuals (includes sub-categories of heterosexual contact with a person at risk for HIV, origin in a country where HIV is endemic and heterosexual as the only identified risk) and other (includes recipients of clotting factor or blood products, perinatal and occupational transmission).

Two main methods are used to estimate both HIV prevalence and incidence: a direct and an indirect method.

Direct Method: [1,2]

HIV prevalence:

Prevalence rate: Estimated population size

HIV incidence:

Incidence rate: Estimated population at risk (total population for that group minus those already infected with HIV).

- Prevalence and incidence rates are estimated from targeted epidemiological studies;
- Population sizes are derived using a variety of methods, including projected population estimates, population-based surveys, and capture-recapture analyses (for IDU).

Indirect Method: [1,2]

Two indirect methods are used together to estimate HIV prevalence. They are both based on the number of HIV diagnoses (obtained from provincial HIV testing databases) and on information about HIV testing behaviour (obtained from population surveys).

- In the first method, the cumulative number of HIV diagnoses (minus cumulative AIDS deaths) is divided by the proportion of the population who have ever been tested for HIV.

- In the second method, the number of HIV diagnoses in 1999 is divided by the proportion of the population who are tested in a one-year period, and the result is then added to the cumulative number of HIV diagnoses to the end of 1998 (minus cumulative AIDS deaths) plus the estimate for 1999 HIV incidence.

HIV incidence is derived using an indirect method by taking the difference between the 1999 and 1996 prevalence estimates and adding 1997-1999 AIDS deaths. The result is an estimate of the number of new infections occurring during 1997-99 which is divided by three to estimate the number during 1999. See the references for a further description of the methods and results.

These methods are carried out for each of British Columbia (B.C.), Alberta (Alta.), Ontario (Ont.) and Quebec (Que.). These four provinces account for 85% of the population of Canada and for 95% of HIV and AIDS diagnoses in Canada. For each exposure category in these provinces, the mean of the direct and indirect methods is taken as the point estimate for both prevalence and incidence. Ranges of uncertainty are calculated using statistical simulation procedures.

The remainder of the provinces and territories are grouped into Saskatchewan/Manitoba/ Northwest Territories/Yukon/Nunavut and the Atlantic provinces (Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland). The prevalence and incidence estimates for these two regions are extrapolated using estimates from B.C., Alta., Ont. and Que. and regional distribution of reported AIDS cases and positive HIV diagnoses.

Prevalence and Incidence Results

As outlined in Table 1, there were an estimated 49,800 people in Canada living with HIV infection (includes those living with AIDS) at the end of 1999 compared with an estimated 40,100 at the end of 1996. This represents an increase of 24%.

An estimated 4,190 Canadians became newly infected with HIV in 1999 (Table 2). Although the estimated incidence in 1999 was essentially unchanged from 1996, the distribution among exposure categories changed significantly. From 1996 to 1999, there was a 30% increase in the number of new infections per year among MSM (from 1,240 to 1,610) and a 27% decline in the number of new infections among IDU (from 1,970 to 1,430).

Table 1: Point estimates and uncertainty ranges for number of prevalent HIV infections in Canada at the end of 1999 compared with point estimates for 1996, by exposure category

	MSM	MSM-IDU	IDU	Hetero	Other	Total
1999	29,600	2,100	9,700	8,000	400	**49,800**
Range	(26,000-33,400)	(1,700-2,600)	(8,100-11,800)	(6,300-10,100)	(330-470)	**(45,000-54,600)**
1996	25,300	1,700	7,100	5,500	500	**40,100**

Table 2: Point estimates and uncertainty ranges for number of incident HIV infections in Canada in 1999 compared with point estimates in 1996, by exposure category

	MSM	MSM-IDU	IDU	Hetero	Other	Total
1999	1,610	270	1,430	880	0	**4,190**
Range	(1,190-2,060)	(190-360)	(1,030-1,860)	(610-1,170)		**(3,310-5,150)**
1996	1,240	290	1,970	700	0	**4,200**

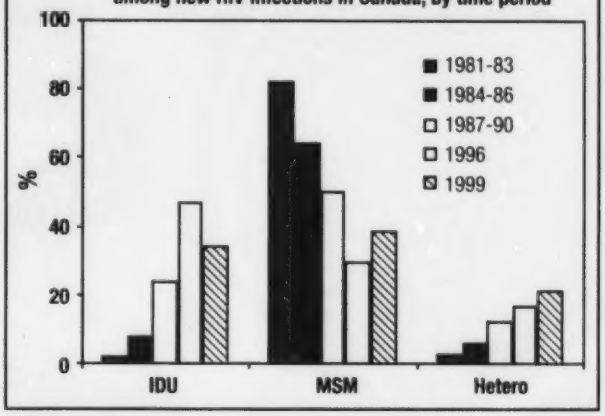
Tables 1 and 2 reflect a rise in the number of prevalent and incidence infections among heterosexuals. The estimated prevalent number of infections to 1999 is 8,000, 45% higher than the estimate of 5,500 in 1996. The number of new infections among heterosexuals increased 26% over this same time period, from 700 to 880 new infections per year.

An attempt was made to specifically evaluate the heterosexual subcategory 'endemic' to estimate what proportion of the epidemic can be attributed to individuals from a country where HIV is predominantly transmitted through heterosexual contact. Based on the proportions in reported HIV positive test reports and reported AIDS cases, it is estimated that this group represents approximately 20% to 30% of the heterosexual exposure category in the national prevalence and incidence estimates. It is important to note that there is considerable variation in this proportion between provinces, and that this estimate is quite uncertain since a large proportion of HIV test reports do not contain complete exposure category information.

Trends in Exposure Category among New Infections

The distributions of exposure categories among new HIV infections shown in Figure 1 clearly outline the changes in the HIV epidemic in Canada. Prior to 1999, the proportion of new infections attributed to IDUs had steadily increased from 2% during 1981-1983 to 24% between 1987-1990 to 47% in 1996. However, 1999 incidence estimates indicate that the proportion has now dropped to 34%. Conversely, the proportion of new infections attributed to MSM demonstrated a steady decline from over 80% in 1981-1983 to 30% in 1996. Recently, however, there has been a sharp increase in the proportion of new infections attributed to MSM to 38% in 1999. The proportion of new infections attributed to the heterosexual exposure category has increased steadily in the last two decades reaching 21% of new infections by 1999.

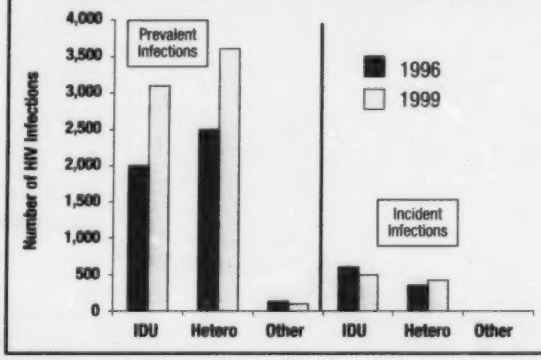
Figure 1: Estimated exposure category distribution (%) among new HIV infections in Canada, by time period



Trends among Women and Aboriginal Populations

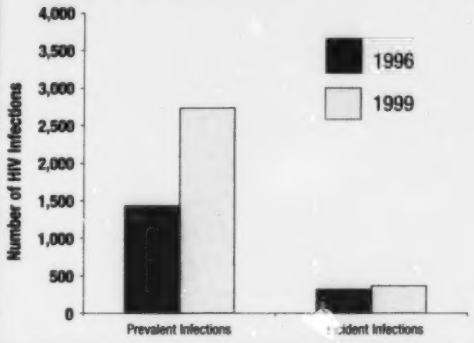
An estimated 6,800 women were living with HIV infection (including those living with AIDS) at the end of 1999, a 48% increase from the 1996 prevalence estimate of 4,600. Thus, women accounted for 14% of the prevalent HIV infections in 1999 compared to 11% in 1996. The number of newly infected women remained just below 1,000 cases per year in both 1999 and 1996 (917 and 950 respectively) (Figure 2). In 1999, 54% of all new HIV infections among women were attributed to IDU and 46% were attributed to the heterosexual exposure category.

Figure 2: Estimated number of prevalent and incident HIV infections among women, by exposure category and year



The estimated number of prevalent HIV infections among Aboriginal populations was 1,430 in 1996 and 2,740 in 1999, an increase of 91% (Figure 3). In 1999, 5.5% of all prevalent HIV infections in Canada were attributed to Aboriginal populations. There were 370 new infections in this group in 1999 (9% of all new HIV infections), 64% of which were attributed to the exposure category IDU, 17% were attributed to heterosexuals, 11% to MSM and 8% to MSM-IDU.

Figure 3: Estimated number of prevalent and incident HIV infections among Aboriginal populations, by year



Comment

The methods employed to estimate HIV prevalence and incidence make maximum use of a wide variety of surveillance and research data. The resulting estimates are necessarily imprecise, but the degree of certainty is improved by using several independent methods in a combined approach. The advantages of this approach are its flexibility and its ability to readily incorporate new data and to highlight gaps in existing knowledge. The fact that the methods to estimate national trends of HIV are largely determined by data from large cities is a major limitation. These estimates do not, therefore, necessarily reflect local trends of HIV incidence and prevalence in Canada.

The 1999 estimates clearly illustrate the changing face of the Canadian HIV epidemic. They highlight a potential resurgence of the epidemic among MSM and an increasing urgency of the situation among Aboriginal populations. Although the estimates indicate a reduction in incidence among IDUs, the absolute number of new infections per year is still unacceptably high in this exposure category.

These findings will be critical for the planning and evaluation of prevention and care programs in Canada. The 1999 estimates support the need to strengthen and improve these programs and provide further evidence of the importance of

enhancing existing surveillance and analysis. Furthermore, results underscore the fact that it is not yet time to reduce vigilance with respect to HIV and AIDS in Canada.

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1. Archibald CP, Remis RS, Farley J, Sutherland D. *Estimating HIV prevalence and incidence at the national level: combining direct and indirect methods with Monte-Carlo simulation.* XI International Conference on AIDS, Geneva, 1998 (Abstract 43475).

2. Geduld J, Archibald C. *National trends of AIDS and HIV in Canada.* CCDR. 2000;26:193-201.

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April 2002

HIV/AIDS
EPI UPDATE
Centre for the Infectious Disease Prevention and Control

At a Glance

- **There were an estimated 49,800 people living with HIV infection in Canada at the end of 1999.**
- **Of these, approximately 15,000 or 30% are not aware of their infection.**
- **Given the new treatments for HIV, it is more important than ever that all Canadians are able to access HIV testing.**

CIDPC Website:
www.hc-sc.gc.ca/hpb/lcdc/bah

Prevalent HIV Infections in Canada: Up to One-Third May Not Be Diagnosed

Introduction

This *Epi Update* presents the estimated number of Canadians who were HIV-infected but unaware of their infection at the end of 1999. It also summarizes available data on the characteristics of persons tested for HIV in Canada.

HIV Testing in Canada

Knowledge of one's HIV status can be useful for several reasons. Counselling received at the time of HIV testing can provide critical information about how to reduce the risk of HIV infection. If an individual is found to be HIV infected, consideration can be given to starting antiretroviral therapy. In the case of pregnant women, treatment can reduce the chances that the infant will be infected from about 25% to 8% or less.[1]

Canadians have had the opportunity to be tested for HIV infection in Canada since the test became available in 1985. Individuals have accessed HIV testing services through either coded or confidential testing at a doctor's office or clinic, or through anonymous testing sites.

Positive HIV test report data are provided by all provinces and territories in Canada to the Centre for Infectious Disease Prevention and Control (CIDPC) and are presented in the most recent semi-annual report: *HIV and AIDS in Canada: Surveillance Report to December 31, 2001*.[2] They are based on non-nominal, confidential HIV testing information with duplicate tests for the same individual removed to the extent possible. The removal of duplicates is necessary to accurately reflect the annual number of new HIV diagnoses. Duplicate

removal rates vary by year, province and type of data (nominal, non-nominal or anonymous). It is important to note that in most provinces, the ability to remove duplicates has improved significantly since 1995.

HIV-Infected but Unaware

There have been approximately 46,000 positive HIV tests reported to CIDPC to December 31, 1999.[3] After adjusting for under and delayed reporting, it is estimated that about 51,000 Canadians have tested positive for HIV from 1985 (when testing became available) to the end of 1999. Of this total, an estimated 15,000-17,000 individuals had died by the end of 1999 (also adjusted for under and delayed reporting). Therefore, of this 51,000 approximately 34,000-36,000 individuals were aware of their HIV infection and were still alive at the end of 1999.

It is important to note that data on positive HIV tests only represent those who have tested positive for HIV infection and do not represent all persons who have been infected with HIV as some individuals who have been infected with HIV have not yet come forward for testing.

In November 2000, CIDPC published estimates of HIV prevalence in Canada to the end of 1999.[4] It was estimated that approximately 49,800 Canadians were living with HIV infection (including those living with AIDS) at the end of 1999. This number includes those who are aware of their infection (had a positive HIV test) and those who are unaware of their infection.

The difference between the total number who were HIV-infected and alive at the end of 1999 (49,800) and the number who were aware of their HIV infection and alive (34,000-36,000) at the end of 1999 represents an estimate of the number of persons unaware of their infection (not yet tested positive for HIV) and alive. This difference is approximately 15,000 or about 30% of the estimated 49,800 Canadians living with HIV infection at the end of 1999.

Characteristics of Persons Tested for HIV

A Canada-wide survey conducted in January 1997 found that 18.6% of men aged 15 years and older and 16.2% of women aged 15 years and older had been tested for HIV (excluding tests for blood donation and insurance purposes).[5] Of those tested, 39% had been tested in the year prior to the survey, 57% in the prior 2 years, and 43% had their most recent test more than 2 years prior to the survey. A 1996 survey found that, taking into account ancillary testing such as donating blood or being tested for life-insurance purposes, 41% of men and 31% of women in Canada had ever been tested for HIV.[6]

National surveys of the general population suggest that those who report risk factors are more likely to be tested:

- Among heterosexuals, those with two or more partners in the last year were more likely to be tested than those with one partner (50.5% vs 17.4%). Of those who reported having had a sexually transmitted disease (STD) in the past 5 years, 58% had been tested compared to 17.4% of those who did not report an STD.[5]

- For men, testing was higher among those who had sexual intercourse with another man (71%), used injecting drugs (62%), received blood or clotting factor between 1978 and 1985 (27%), or had a partner with a risk factor (IDU, having received blood or clotting factor between 1978 and 1985, origin in from country endemic for HIV) (30%).5 For women, testing was higher among those who had received blood or clotting factor between 1978 and 1985 (32%), had a high-risk partner (38%), or had sexual intercourse with a man since 1978 (17%).[6]

- Testing is highest among individuals aged 25 to 34 years. Even after taking into account all other risk factors, those aged ≥45 years are still less likely to be tested than are those < 45 years.[5,6]

- Although those reporting risk factors such as IDU, multiple partners, or MSM are more likely to be tested, a substantial proportion of those reporting risk factors have not been tested recently, or have not been tested at all. For example, among those who report more than one partner in the last year and not using condoms consistently, 53% of men and 38% of women have never been tested.[5]

Comment

Canadians with risk factors for HIV infection are more likely to have been tested for HIV than those without such risk factors. However, there is still a significant proportion of persons with risk factors who have never been tested for HIV. It has been estimated that there are approximately 15,000 people or 30% of the HIV-infected population who are unaware that they are infected. More information is needed about individuals who are at risk for HIV, but who have not been tested. Given these data, and the fact that new treatments are available for HIV infection, it is more important than ever that all Canadians be able to access HIV testing, particularly those at highest risk for HIV infection.

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HIV/AIDS
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At a Glance

- **HIV infection is reportable in all provinces and territories except British Columbia.**
- **HIV testing can be nominal, non-nominal or anonymous; however, anonymous testing is not available in all provinces and territories.**
- **HIV testing patterns in Canada, along with the profile of people being tested, provide important information for designing and targeting intervention programs.**

CIDPC Website:
www.hc-sc.gc.ca/hpb/lcdc/bah

HIV Infection Reporting in Canada

Introduction

In the spring of 1998, the Centre for Infectious Disease Prevention and Control surveyed Canada's provinces and territories to determine where HIV infection is reportable and the types of HIV testing being offered.[1] The methodology and results of that survey were published in an *Epi Update* released in May 1999.

Although much of the information collected from the survey has not changed, this *Epi Update* provides the most up to date information available on HIV infection reporting in Canada. It describes the types of HIV testing available, including anonymous HIV testing (AHT) available in each province and territory and describes the jurisdictions in Canada where HIV infection is notifiable.

The most recent Canadian HIV and AIDS surveillance report indicates that the total number of AIDS cases and positive HIV tests reported in Canada since the beginning of the epidemic to December 31, 2001 are 18,026 and 50,259, respectively.[2] These numbers give some indication of the magnitude of the HIV/AIDS epidemic in Canada. However, these data do not reflect the full extent of the problem as they do not include HIV-infected persons who have not been tested and therefore, are still unaware of their infection. Details on the characteristics of persons tested for HIV are outlined in the April 2002 *Epi Update* entitled "Prevalent HIV Infections in Canada: Up to One-Third May Not Be Diagnosed."

HIV testing patterns within the general population, along with the profile of people being tested, are important for designing and targeting intervention programs[3], and for developing a context for HIV/AIDS surveillance data.

HIV Infection Reportable in Nine Provinces and Three Territories

Information regarding where HIV infection is notifiable, as well as, the types of HIV testing services offered throughout Canada is summarized in Table 1.

- HIV infection is legally notifiable in all provinces and territories except British Columbia (HIV infection became notifiable in Quebec on April 18, 2002). The majority of these provinces and territories had HIV reporting legislation in place by the mid- to late-1980s.

- HIV reporting is governed by legislation enacted by each province or territory, and requires that 'nominal/name-based' or 'non-nominal/non-identifying' information about an individual who tests positive for HIV be forwarded to provincial/territorial public health officials.

- In most testing situations, laboratories and physicians are responsible for reporting HIV infection, but this varies by province or territory.

Table 1: HIV Testing and HIV Reporting by Province/Territory

Prov/ Terr	Type of HIV Testing Available	HIV Infection Reportable Since[1]	HIV Infection Reportable By:	Level of Reporting to the Prov/Terr
B.C.	N, NN, A	—	—	—
Yukon	N, NN	1995	P,	
NWT	N, NN	1988	L, P, RN	N
Nunavut	N, NN	1999	L, P, RN	N
Alta.	N, NN, A	1998	L, P	NN
Sask.	N, NN, A	1988	L, P	NN
Man.	NN	1987	L, P	NN
Ont.	N, NN, A	1985	L, P	N, NN[2]
Que.	N, NN, A	2002	L, P	NN
N.B.	N, NN, A	1985	L, P, RN	NN
N.S.	N, NN, A	1985	L, P	N
P.E.I.	N, NN	1988	L, P, RN	N, NN
Nfld.	N, NN, A	1987	L, P	N

A = Anonymous, L = Lab, N = Nominal/Name-Based, P = PhysicianNN = Non-Nominal/Non-Identifying, RN = Nurse

1 Refers to legislation governing the type of HIV infection reporting to provincial/territorial health officials and the year it came into effect.

2 In Ontario, HIV positive data from AHT are reported non-nominally at the provincial level.

Nominal/Name-Based and Non-Nominal/ Non-Identifying HIV Testing

- Nominal/name-based HIV testing is available in all provinces and territories except Manitoba. This service is available through many health care providers by request.

- Non-nominal/non-identifying HIV testing is available in all provinces and territories. Testing can be accessed through health care providers, community or public health clinics, clinics for sexually transmitted infections, sexual health units or nursing stations depending on the province/territory.

Anonymous HIV Testing

- As shown in Table 2, anonymous HIV testing (AHT) is available in eight provinces. AHT is offered through community or public health clinics, sexual health centres, and by some health care providers.

- Anonymous testing may encourage more people to come forward for HIV testing and counselling since this practice offers the highest degree of confidentiality (i.e. personal identifiers are not requested or recorded).[4]

- Several studies in the United States have shown that AHT programs encourage people to be tested for HIV, especially those at high-risk or who would not volunteer for testing under nominal/name-based or non-nominal/non-identifying circumstances.[5,6,7]

- In its first year of operation, AHT sites in Ontario tested approximately 5% of the total tested population, and most often served individuals at high risk of HIV infection, especially men who have sex with men.[8]

Table 2: Status of Anonymous HIV Testing by Province/Territory

Prov/ Terr	AHT Since[1]	AHT Sites	AHT Data Reported[2]	Counselling Services Available
B.C.	1985	Any Physician's Office	No	Yes
Yukon	—	—	—	—
NWT	—	—	—	—
Nunavut	—	—	—	—
Alta.	1992	3	Yes	Yes
Sask.	1993	3	Yes	Yes
Man.	—	—	—	—
Ont.	1992	33	Yes	Yes
Que	1987	60+	No	Yes
N.B.	1998	7	—	Yes
N.S.	1994	1	Yes	Yes
P.E.I.	—	—	—	—
Nfld.	**	6	Yes[3]	Yes[3]

** AHT is available upon request, but are not the official guidelines for the province/territory.

1 Refers to the availability of AHT in the respective province/territory, and the year in which AHT was implemented.

2 Refers to whether or not HIV positive test data from AHT is reported to the Centre for Infectious Disease Prevention and Control, Health Canada.

3 If someone tests positive for HIV through AHT, that individual then becomes part of the nominal/name-based system, where counselling, follow-up care and HIV data reporting are all done nominally.

Comment

All provinces and territories in Canada offer at least one form of HIV testing: 1) nominal/name-based; 2) non-nominal/non-identifying; and/or 3) anonymous testing. HIV infection is legally notifiable in nine provinces and three territories, however, each of these has a different practice for reporting HIV infection. Although British Columbia does not currently have legislation governing HIV infection reporting, these provinces is still able to collect some data about HIV infection from the provincial HIV testing laboratory.

At present, nominal/name-based and non-nominal/non-identifying HIV testing is widely available in Canada, however, anonymous HIV testing is available in only eight provinces. Increased availability and accessibility to different types of HIV testing may allow individuals to choose the testing and counseling environment in which they feel most comfortable, thereby encouraging more people to be tested and facilitating the targeting of intervention and treatment programs.[9]

For more information on HIV testing, please contact your provincial or territorial public health department.

References

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April 2002

HIV/AIDS
EPI UPDATE
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At a Glance

- **Risk behaviour data on young Canadians show the potential for HIV transmission.**
- **Street-involved youth and youth who inject drugs are particularly vulnerable to HIV.**
- **A wide range of prevention activities needs to be implemented to help minimize the risk of HIV transmission among youth.**

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HIV and AIDS Among Youth in Canada

Introduction

Although youth (defined here as those age 10 to 24 years) currently constitute a small proportion of the total number of reported HIV and AIDS cases in Canada, they are a group that has been greatly affected by the HIV/AIDS epidemic at a global level. According to the most recent UNAIDS report, an estimated 10.3 million people age 15-24 years are living with HIV/AIDS, and half of all the new infections that are occurring worldwide are occurring among young people.[1] Youth, in general, are vulnerable to HIV infection as a result of many factors, including risky sexual behaviour, substance use (including injecting drug use), and perceptions that HIV is not a threat to them. Young Canadians require the necessary information and skills to help them to adopt and maintain behaviours that are protective against HIV. This *Epi Update* provides the most current information on the status of HIV and AIDS among Canadian youth. HIV-related risk behaviours in this population are also highlighted.

AIDS Data[2]

- As of December 31, 2001, a total of 18,204 AIDS cases with age information had been reported to the Centre for Infectious Disease Prevention and Control (CIDPC). Of these, 620 (3.4%) were among youth age 10 to 24 years.
- As seen in Table 1, of the cumulative reported AIDS cases in youth age 10 to 19 years of age, almost two thirds of cases were attributed to recipients of blood and blood products. Among youth age 20 to 24 years of age with AIDS, half were attributed to men who have sex with men (MSM), and 21% to heterosexual contact.

Table 1: Number of reported AIDS Cases with Associated Exposure Categories (%) for Individuals 10 to 24 Years of Age in Canada, Diagnosed up to December 31, 2001

Category	10 -19 years of age	20-24 years of age
Number of Cases	85	535
Percentage of all reported AIDS cases	0.5%	3%
Associated Exposure Categories[1]	66% Blood & Blood Products 11% MSM 10% Heterosexual Contact/Endemic 5% IDU 5% MSM/IDU 1% Other*	50% MSM 21% Heterosexual Contact/Endemic 11% MSM/IDU 11% IDU 7% Blood & Blood Products 0% Other*

IDU = Injecting Drug Users, MSM = Men who have sex with men

1 Pecentages based on the total number of cases minus those reports for which exposure category was unknown or "not identified."

* Mode of transmission is known but cannot be classified into any of the major exposure categories.

HIV Testing Data[2]

Data received from provincial and territorial HIV testing programs do not allow separation of the 10 to 14 and 20 to 24 year age groups before 1998, thus restricting the analysis of HIV test reports for youth.

- As of December 31, 2001, a total of 45,628 positive HIV tests with age information had been reported to CIDPC. Of these, 664 (1.5%) were among youth age 15 to 19 years, and 12,365 (27.1%) were among individuals age 20 to 29 years.
- The proportion of females among positive HIV test varies considerably by age and is highest among adolescents and young adults. In 2001, females accounted for 44.5% of positive HIV test reports among those aged 15 to 29 years, an increase from 41% in 2000.
- In 2001, heterosexual contact, MSM and injecting drug use accounted for 41%, 32%, and 21% respectively of reported positive HIV tests with known exposure category among those age 20 to 29 years. Injecting drug use and heterosexual contact accounted for 40% and 35% of reported HIV tests with known exposure category among those age 15 to 19 years (n=19).
- A cumulative total of 697 positive HIV test reports had been received for individuals less than 15 years of age by the end of 2001. Among the 346 cases in this group with known exposure category information, perinatal transmission and exposure to infected blood and blood products accounted for over 90% of cases.

HIV Incidence and Prevalence among Youth

HIV prevalence and incidence information, in conjunction with HIV/AIDS surveillance data, are more useful than are surveillance data alone for depicting the current magnitude of the HIV epidemic in various population sub-groups. To date, few Canadian studies have examined HIV prevalence or incidence among youth, and almost all research has involved higher risk populations:

- In the Vancouver Injection Drug User Study (VIDUS), the prevalence of HIV among injecting drug users age 24 years and younger during the period 1996-2001 was 17%. HIV incidence among participants in this age category was reported as 2.96 for males and 5.69 for females per 100 person years.[3]
- The incidence of HIV among participants in the Montreal Street Youth Cohort Study (age 13 to 25 years) was 0.72% in 1999, up slightly from 0.55% in the period 1995-1998.[4,5] An HIV prevalence of 0.25% was observed in the mid-1990s among young offenders age 12 to 19 years in British Columbia, many of whom reported a history of injecting drug use.[6] Among male participants in the Montreal Street Youth study in 2000 who reported having sex with men, the prevalence of HIV was 4.9%.[7]
- Sentinel hospital surveillance of HIV infection in Quebec (early 1990s)[8], a study of women seeking prenatal care in British Columbia (early 1990s)[9], and a survey of

youth from across Canada involved in an international exchange program (early to mid 1990s)[10] reported prevalence rates of 0.04% to 0.08% among young people age 14 to 25 years. In a study in the late 1990s of women seeking abortions in Montreal, the prevalence of HIV among those age 20 to 24 years was 0.0015%, and there were no infections detected among women under 20 years of age.[11] It should be noted that these latter studies involved relatively small, non-representative samples of youth, and, thus, a zero to very low HIV prevalence rate is not necessarily reassuring.

Risk Behaviour Data Among Youth

Research shows that Canadian youth begin to have sexual intercourse at a relatively early age:

- In the 1996 National Population Health Survey (NPHS), 25.6% of female participants in the 15 to 19 year age group reported that they had had intercourse by the age of 15 years. Almost 20% of young men in this age group also reported that they had begun having intercourse by this age.[12]

A substantial proportion of young people report having multiple sexual partners in the past year:

- Among sexually experienced, single respondents (those never-married, divorced and widowed) in the 1996 NPHS, 29.4% of males age 15 to 19 years had had more than one sex partner in the past 12 months, and 27.5% of males age 20 to 24 years had had more than one sex partner in this same time period. In comparison, 21.8% of females age 15 to 19 years had had more than one intercourse partner in the past 12 months, and the same percentage of females (21.9%) age 20 to 24 years had had more than one intercourse partner in this time frame.[12]

Research suggests that many Canadian youth are having unprotected sexual intercourse. Not using condoms appears to be more common among young women than it is among young men:

- Among sexually active youth age 15 to 19 years in the 1994 NPHS (excluding subjects who had a single sex partner and who were married, common-law, divorced, or widowed), 51% of females and 29% of males reported never or only sometimes using a condom in the past year.[13] The corresponding percentages among those age 20 to 24 years were 53% and 44%.[13]

- In an ongoing study of Montreal street youth, only 13.2% of participants reported always using condoms during vaginal intercourse, and only 32.4% reported always using condoms during anal intercourse.[14]

The extent of unprotected intercourse among youth is further captured in rates of chlamydia and gonorrhea among those age 15 to 24 years:

- Figure 1 shows that in 2000, the reported incidence of chlamydia in Canada was highest among females age 15 to 19 years (1236.1/100,000 women). The reported incidence of gonorrhea in Canada was also highest among this group of young women (96.4/100,000).[15,16] (Figure 2)

Research reveals that levels of injecting drug use and injecting risk behaviours among youth, particularly those who are street-involved, require ongoing assessment:

- In a study of IDUs in Calgary in 1998, 46% of participants who were under age 25 years reported that they had borrowed injection equipment in the previous six months compared to 24% of participants who were age 25 years or older.[17]

- Recent results from the ongoing Montreal StreetYouth Cohort Study showed that 47% of participants had a history of injecting drug use. Also alarming was the incidence of the initiation of injecting drug use, estimated to be 7.9 per 100 person-years.[18]

Figure 1: Reported Genital Chlamydia Rates in Canada by Age Group and Sex, 2000.

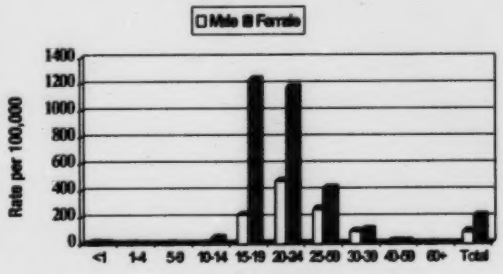
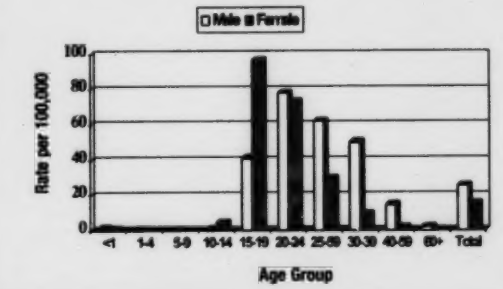


Figure 2: Reported Gonorrhea Rates in Canada by Age Group and Sex, 2000.



Comment

HIV/AIDS is affecting many subgroups of the Canadian population, including youth. Although the limited data that are available suggest that HIV prevalence is currently low among youth, sexual risk behavior and STD data clearly indicate that the potential for HIV spread exists among young Canadians. More incidence and prevalence information as well as trend data on HIV-related risk behaviours are needed in order to guide and evaluate prevention programs for young Canadians. Epidemiologic and behavioural data for high risk youth, such as street youth, are also needed to fully assess the risk of HIV transmission among Canada's youth population.

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HIV/AIDS
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At a Glance

- **In Canada, a total of 1,403 AIDS cases and 5,956 HIV cases have been reported in adult women up to December 31, 2001.**
- **Women represent an increasing proportion of reported HIV cases in Canada, and accounted for 25% of positive HIV test reports in 2001.**
- **Heterosexual contact and injection drug use are the two major risk factors for HIV infection in women.**

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HIV and AIDS Among Women in Canada

Introduction

The HIV/AIDS epidemic in Canada has changed from the early epidemic that affected primarily men who have sex with men (MSM) to the current epidemic which increasingly affects other groups such as injecting drug users (IDU) and heterosexuals. As a result of this shift, HIV/AIDS affects a growing number of women. The HIV/AIDS epidemic among women is of particular concern because of the potential for transmission to their infants. This report updates the status of HIV and AIDS among adult and adolescent women (15 years and older) in Canada.

AIDS

In Canada, of the 17,810 cumulative AIDS cases in adults reported up to December 31, 2001 to the Centre for Infectious Disease Prevention and Control (CIDPC), 1,403 (7.8%) were among women. The proportion of AIDS cases among women (relative to all reported AIDS cases in adults for which gender and age are known) has increased over time, from 5.6% before 1992 to 8.3% in 1995 and peaking at 16.4% in 1999. In 2001, the proportion of AIDS cases among women has remained at 16%.

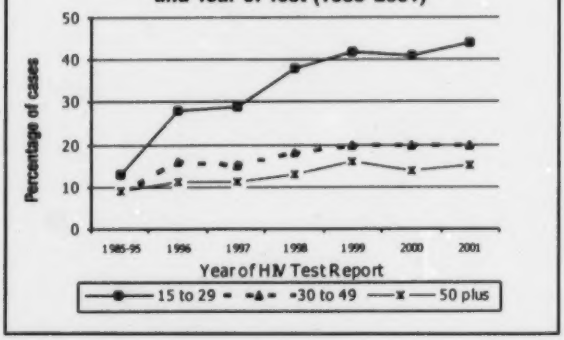
Of all cumulative reported AIDS cases in women, 67.4% are attributed to heterosexual contact, 22.9% to injecting drug use and 9.5% to recipients of blood and blood products. There has been a steady increase in the proportion of adult female AIDS cases attributed to IDU, from 17.8% prior to 1996 to 26.6% in 1996 and 34.9% in 2000.

HIV

AIDS data can contribute to an understanding of trends in HIV infections, but only on those acquired approximately 10 years in the past. In contrast, positive HIV test reports provide a picture of more recent infections. Data from provincial and territorial HIV testing programs indicate that a total of 5,956 positive HIV tests with known age and gender have been reported in adult women up to December 31, 2001.

Women account for a growing proportion of positive HIV test reports with known age and gender among adults in Canada. The proportion of females each year has risen, from 9.7% in the years between 1985 and 1995 to nearly 25% of adult positive HIV test reports between January 1999 and December 31, 2001. The proportion of women among positive HIV tests vary considerably by age and is highest among adolescents and young adults (Figure 1). In 2001, women accounted for 44.5% of positive HIV test reports among those aged 15 to 29 years, an increase from 41% in 2000.

Figure 1: Proportion of Positive HIV Test Reports Attributed to Women by Age Group and Year of Test (1985-2001)



Among women, the primary exposure categories associated with newly diagnosed HIV infection are heterosexual contact and IDU (Table 1). In 2001, heterosexual contact and IDU exposure categories together accounted for 95.1% of newly diagnosed HIV infections; this represents an increase from 82.7% for the period 1985-1995. Heterosexual contact still remains the main risk factor for HIV infection in women. However, injecting drug use continue to be a significant risk for HIV among Canadian women and in some studies this risk is greater for female IDUs than for male IDUs. A recent study in Vancouver estimated the HIV incidence rate among female injecting drug users to be about 40% higher than those of male users.[2]

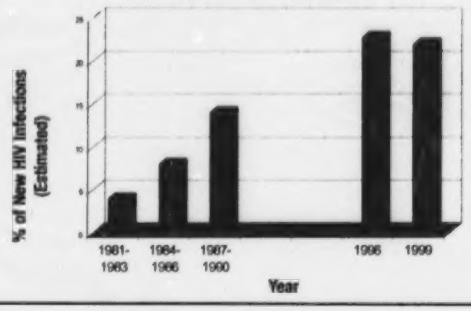
Table 1: Proportion of Positive HIV Tests among Adult Females by Exposure Category and Year of Test, Canada

	Exposure Category		
Year	Heterosexual Contact	IDU	Blood & Blood Products
1985-95	46.5	36.2	10.7
1996	43.4	51.1	1.3
1997	45.7	45.0	1.4
1998	52.8	38.8	3.6
1999	48	47.9	1.2
2000	55.0	39.6	1.7
2001	63.5	31.6	1.6
TOTAL	48.9	39.6	6.0

HIV Incidence Estimates Suggest Rising Number of New Infections Among Women in Canada

Data from positive HIV test reports do not provide the complete picture of the annual number of new HIV infections since only a proportion of those newly infected are tested in the same year. Furthermore, not all HIV tests reported in a given year were infected in that year. The CIDPC has estimated the annual number of new HIV infections using information from AIDS case reports, provincial HIV testing databases, population-based surveys, targeted epidemiologic studies, and census data. In 1999, approximately 4,190 persons in Canada became newly infected with HIV, with an estimated 920 (21.9%) among women.[1] The estimated proportion of women among new HIV infections has increased since the 1980s.[1] In 1996 and 1999, it was estimated that women accounted for more than one of every five new infections[1] (Figure 2).

Figure 2: Estimated Proportion of Women Among New HIV Infections



These recent estimates also indicate that the number of women in Canada living with HIV, including those with AIDS, continues to grow. By the end of 1999, an estimated 6,800 women were living with HIV, an increase of 48.0 % from the 1996 estimate of 4,600.[1]

HIV among Pregnant Women and Women of Childbearing Age

HIV testing during pregnancy is an option available to women across Canada. However, physician guidelines and/or recommendations encouraging informed decisions regarding HIV testing during pregnancy vary by province and territory. These are discussed in detail in the Epi Update entitled "Perinatal Transmission of HIV," April 2002.

HIV prevalence studies among pregnant women can provide an important source of information on the prevalence rate of HIV in the general heterosexual population. Prenatal seroprevalence studies in Canada report an estimated national rate of HIV infection among pregnant women of 3-4/10,000 population.

Large metropolitan areas report higher rates of HIV infection among pregnant women (4.7 for Vancouver versus 3.4 for the rest of B.C. in 1994[3]. 15.3 for Montreal versus 5.2 for the province of Quebec in 1990[4]). Even provinces without large metropolitan areas have indicated significant rates (for example, 4.1/10,000 in New Brunswick for 1994-96[5]). Data from Manitoba suggest an increasing trend of HIV infection among women of childbearing age, from 0.7/10,000 in 1991 to 3.2/10,000 in 1994-95[6].

Studies are ongoing in Ontario and B.C. to update the prevalence estimates of HIV among women of childbearing age.

Comment

Women in Canada are increasingly becoming infected with HIV, especially injecting drug users and women with high risk sexual partners. Efforts to reduce transmission of HIV will need to focus on promoting safer sexual behaviours and reducing substance abuse.

All women, and especially women of childbearing age, should have access to HIV testing, counselling and care. Better data on the trends, risk factors and geographic shifts of HIV among Canadian women are needed to help target prevention and care programs.

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HIV/AIDS
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At a Glance

- **As of December 31, 2001, 11.5% (2,074) of all reported AIDS cases have been among persons age 50 years or older.**
- **Approximately 10% of the positive HIV test reports in Canada each year since the beginning of the epidemic have been among those age 50 years or older.**
- **Sexual contact is the major risk factor for HIV infection in older Canadians.**

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HIV/AIDS among Older Canadians

Introduction

HIV/AIDS has been generally believed to be a younger person's disease and as a consequence, little focus has been given to the issue of HIV/AIDS among older Canadians. It should be noted that the age range for "older adult" is subjective, and the lower age limit in the literature varies between 40 years to 55 years of age. For the purpose of this report, older individuals will be defined as those age 50 years or older.

AIDS Case Report Data[1]

- As of Dec 31, 2001, 18,024 AIDS cases with age information have been reported to the Centre for Infectious Disease Prevention and Control (CIDPC). Of these reports, 2,074 (11.5%) have been among persons 50 years of age or older.
- Figure 1 shows that the number of annual AIDS cases reported among older adults has decreased since the first half of the 1990s. However, with respect to all reported AIDS cases, the proportion of cases among those over 50 years of age has increased to 21.3% in 2001. It is important to note that this increase may be influenced by the use of highly-active antiretroviral treatment (HAART), which may have delayed the onset of AIDS in a large percentage of HIV-infected adults.

Fig 1. Number of Reported AIDS cases among persons over 50 yrs and percentage of all reported AIDS cases by year (1992-2001)

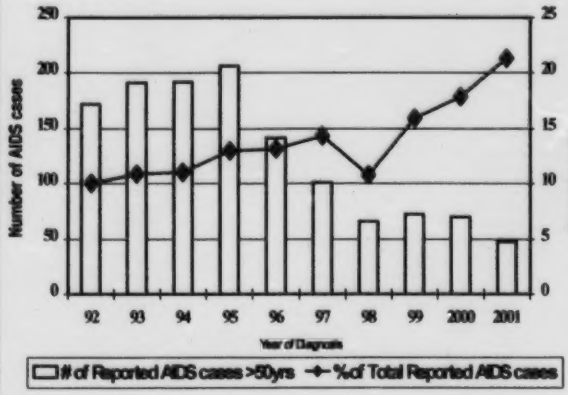


Table 1 shows the distribution of exposure categories for all reported AIDS cases among older Canadians up to December 31, 2001. Men who have sex with men (MSM) made up the majority of reported cases among those age 50-59 and those age 60 years and older. Other common exposure categories were exposure to blood and blood products (before 1985) and heterosexual contact.

Table 1. Distribution of Exposure Categories Among Reported AIDS Cases for Individuals 50 Years of Age and Older in Canada, Diagnosed up to December 31, 2001

Exposure Category	% in each Exposure Category[1]	
	50-59 years (n=1419)	≥ 60 years (n=507)
MSM	70.4	50.8
MSM/IDU	2.3	1.0
IDU	3.5	1.6
Blood/Blood Products	5.8	18.1
Heterosexual Contact	17.8	27.7
Other *	0.2	0.8

IDU = Injecting Drug Users, MSM = Men who have sex with men

1 Pecentages based on the total number of cases minus those reports for which exposure category was unknown or "not identified."

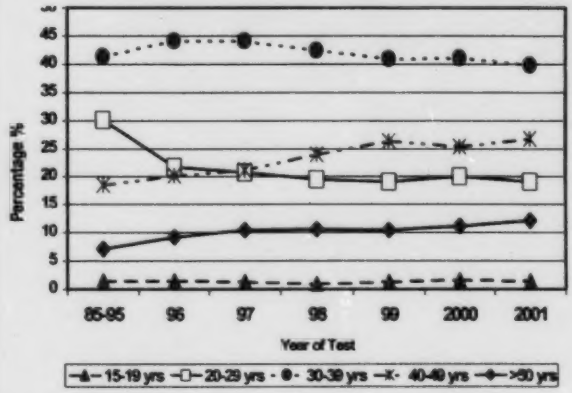
* Mode of transmission is known but cannot be classified into any of the major exposure categories.

HIV Testing Data[1]

While AIDS data provide information on HIV infection that occurred about ten years in the past, HIV data provide a picture of more recent infections.

Data from provincial and territorial HIV testing programs indicate that a total of 3,712 positive HIV tests with known age information have been reported among persons 50 years and older up to December 31, 2001. As seen in Figure 2, the proportion of annual positive HIV test reports among those age 50 years or older has been roughly 10% since the early to mid 1990s. Men have accounted for 88.4% of the cumulative 3,440 positive HIV test reports with known gender information among those age 50 years or older (data not shown).

Figure 2. Percentage of Positive HIV Test Reports by Age and Year (1985-2001)



In 2001, 46% of HIV positive test reports among those age 50 years and older with known exposure category information were attributable to MSM. Heterosexual contact accounted for 34.4% of positive HIV test reports among those age 50 years or older (Table 2).

Table 2. Distribution of Exposure Categories Among Positive HIV Test Reports for Individuals 50 Years of Age and Older in Canada, reported between January 1, 2001 and December 31, 2001

Exposure Category	% 50 years and older[1] (n=119)
MSM	46.3
MSM/IDU	0.8
IDU	10.9
Blood/Blood Products	3.4
Heterosexual Contact	34.4
Other*	4.2

IDU = Injecting Drug Users, MSM = Men who have sex with men

1 Pecentages based on the total number of cases minus those reports for which exposure category was unknown or "not identified."

* Mode of transmission is known but cannot be classified into any of the major exposure categories.

More Information Needed: Older Adults and Risk Behaviors, HIV Testing Patterns, and Knowledge of HIV/AIDS

Healthy sexual relationships continue to be an important part of life for the majority of older adults. The availability of sexual partners and one's state of health may be greater factors in determining sexual activity than is age.[2]

- In one international study of adults age 45 years and older (n=1,384), 51.7% of men and 55.1% of women who reported having a sexual partner (n=949) reported having sexual intercourse once a week or more during the past six months.[2]

Although surveillance data for Canada suggest that sexual contact is the major risk factor for HIV infection among older adults, very little research has been conducted on risky sexual behavior among older Canadians. However, some information has been captured by national population surveys:

- Table 3 compares selected sexual risk behaviors among respondents age 50-59 in the 1996 National Population Health Survey to all respondents.[3] While sexual risk behaviors were reportedly lower among older participants, they were not unsubstantial.

Table 3: High-Risk Sexual Behaviors Among Canadians Age 15-59 Compared to Those Age 50 to 59 Years, 1996 National Population Health Survey[3]

Age Category	Never used condoms *,a,b	Did not use condom at last sex *,a,b	3+ sexual partners in last year [b]
15-59 yrs	8%	16%	3%
50-59 yrs	7%	8%	1%

* Use of a condom with a sexual partner of less than 12 months duration.

a As a percentage of those in a relationship with a partner of less than 12 months duration.

b As a percentage of those who had sexual intercourse in the previous year.

- Table 4 suggests that older Canadians are less likely to have had an HIV test during their lifetime than is the general adult population. Additionally, the percentage of older adults who have been tested for HIV declines with age.

Table 4: Lifetime Testing for HIV/AIDS, 1996 National Population Health Survey[3].

Age Category	% Lifetime HIV Testing
All ages 18 +	15%
45-54 yrs	11%
55-64 yrs	7%
65-74 yrs	4%
75+ yrs	2%

International studies suggest that some older adults may not be aware of HIV prevention methods or behaviors that put them at risk of HIV:

- In a 1996 US-based study, 14.7% of the respondents age 50-64 did not know if condoms were effective in preventing HIV infection compared to 6.3% of the respondents age 18-49.[4]

Comment

Older adults constitute a substantial minority of reported HIV and AIDS cases in Canada. More epidemiological and behavioural data are needed to better understand the HIV/AIDS situation among older adults and to inform prevention and care programs. Population-based surveys should include questions regarding condom use and number of sexual partners, as well as HIV testing behaviours, for all age groups. Attitudes and knowledge about HIV/AIDS should be studied among those age 50 years and older in order to assess the potential misconceptions or knowledge gaps that older adults may have in regard to HIV transmission and prevention. Given that one of the main exposure categories among reported positive HIV tests among older adults is MSM, research into the risk behaviors of older MSM needs to be supported, and qualitative studies examining the reasons why some older MSM engage in higher risk practices need to be undertaken.

As our society ages and persons with HIV/AIDS live longer due to improved medical treatment, it is likely that HIV/AIDS among older adults will become a greater issue. While older adults have historically been excluded from many aspects of HIV/AIDS policy and programming, the available data show that this should not be the case. The data presented here should help to overcome the ageist assumption that persons age 50 years and older are not at risk of HIV infection.

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April 2002

HIV/AIDS
EPI UPDATE
Centre for the Infectious Disease Prevention and Control

At a Glance

- **HIV testing and antiretroviral treatment can dramatically reduce mother-to-child HIV transmission .**
- **Provincial HIV prevalence rate among pregnant women is 3-4/10,000 in Canada.**
- **The use of antiretroviral therapy in HIV-positive pregnant women is increasing.**
- **All pregnant women, and women considering pregnancy, should have access to prenatal care that includes the offer of HIV testing as well as appropriate counselling and care.**

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Perinatal Transmission of HIV

Introduction

Perinatal (or vertical) transmission of HIV is the transmission of HIV from an infected pregnant women to her newborn child. Transmission can occur during gestation (in utero), during delivery (when the fetus makes contact with maternal blood and mucosa in the birth canal) or after delivery, through breastmilk. Therefore, women of childbearing age (15-44 years) are of particular concern since they may transmit HIV infection to their newborn children. In this report, the status of perinatal HIV transmission in Canada and of HIV testing recommendations for pregnant women are discussed.

AIDS Case Reports

As of December 31, 2001, 18,026 AIDS cases have been reported to the Centre for Infectious Disease Prevention and Control (CIDPC) in Canada, including 1,403 cases (7.8%) among adult women (aged 15 and older). Of these, 1,121 (79.9%) were among women of childbearing age (15-44 years).[1]

For pediatric AIDS cases (children 0-14 years), 208 cases were reported since testing began, and 165 of these (79%) were attributed to perinatal transmission.

HIV among Pregnant Women and Women of Childbearing Age

HIV prevalence studies among pregnant women indicate a provincial rate for Canada of about 3-4/10,000, although data for some provinces have not been updated for 5 or more years. The provincial range is from 1.9/10,000 (Ontario 1991-1992[2]) to 8.7/10,000 (Newfoundland 1991-1993[3]) and large metropolitan areas have higher rates (4.7 for Vancouver versus 3.4 for the rest of B.C. in 1994[4], and 15.3 for Montreal versus

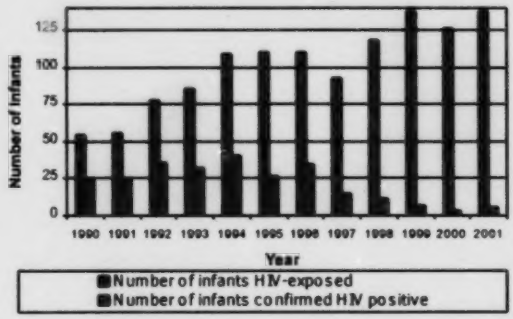
5.2 for the province of Quebec in 1990[5]). However, even provinces without large metropolitan areas have significant rates (for example, 4.1/10,000 in New Brunswick for 1994-1996[6]) and data from Manitoba suggest an increasing trend of HIV infection among women of child-bearing age (from 0.7/10,000 in 1991 to 3.2/10, 000 in 1994-1995[7]).

Transmission of HIV from Mother to Child

In Ontario, 34 HIV-infected infants were born to HIV-positive mothers during 1984-1989, and 59 such infants were born during 1990-1997. During 1984-1997, just over 58% of the HIV-positive mothers reported their risk factor for HIV as being from an endemic country, where heterosexual transmission of HIV is the most likely mode of transmission.[8]

At the national level, over the past decade, the number of infants born to HIV-infected mothers (HIV-exposed infants) has increased from 56 in 1991 to 138 in 2001, as seen in Figure 1.[1] The figure also depicts the reported number of infants born to HIV positive mothers and the number of infants who, to date, have confirmed HIV infection (data from the Canadian Pediatric AIDS Research Group).[1]

Figure 1: Reported Number of Infants Exposed to HIV in Utero and the Number with Confirmed HIV Infection



Of the reported total of 1,384 infants who were exposed to HIV from their mothers between 1984 and 2001, 375 have been confirmed HIV positive and an additional 56 have indeterminate serostatus and are currently being monitored. Of the exposed infants over the past decade, an increasing proportion had received some treatment during the course of their gestation and/or after birth. This is in part reflected in the decreasing number of HIV positive infants born since 1996.

Provincial Prenatal HIV Screening Recommendations

In all Canadian provinces, HIV testing of pregnant women remains the choice of the woman. Guidelines and/or recommendations have been developed to encourage informed decisions in terms of HIV testing during pregnancy.

Newfoundland and Labrador: In 1997, the Newfoundland and Labrador Advisory Committee on Infectious Diseases recommended that HIV testing be added to the existing prenatal screening program. HIV testing is done as part of the routine prenatal screen, unless the woman declines. The Newfoundland and Labrador Medical Association and the provincial Public Health Laboratory and Department of Health and Community Services have supported this recommendation and have worked to actively notify physicians and patients of this recommendation.[9]

Prince Edward Island: In June 1999, the PEI Department of Health and Social Services formally adopted a policy of supporting HIV testing for all pregnant women and recommends that physicians offer HIV testing at the first prenatal visit.[10]

Nova Scotia: The Reproductive Care Program recommends that HIV testing should be offered to all pregnant women, together with other prenatal tests in the first trimester. Women who decline testing in the first trimester or who are known to engage in high risk activities should be offered testing again during the latter stages of their pregnancy.[11]

New Brunswick: The New Brunswick Medical Society's Subcommittee on Perinatal Health Care recommended, in July 1999, that physicians should routinely encourage all pregnant women to be tested for HIV with appropriate pre- and post-test counseling and informed consent. In addition, nominal and non-nominal HIV testing and counseling are available through physicians and sexual health centres, and anonymous testing is available at sexual health centres.[12]

Quebec: Since 1997, as part of an intervention program on HIV infection and pregnancy, the Ministry of Health and Social Services, in accordance with the College of Physicians, initiated a program recommending that all pregnant women and women contemplating pregnancy be offered an HIV test.[13]

Ontario: On December 1, 1998, the Minister of Health announced that the prenatal screening program would be expanded to include HIV testing. Through this expanded program, all pregnant women are offered an HIV test as part of their prenatal care. The HIV test is performed only after counseling is provided and informed consent is given.[14]

Manitoba: Manitoba Health revised its prenatal HIV testing policy in early 2001. The current policy strongly recommends that all physicians provide appropriate information and testing for HIV to all pregnant women as part of routine prenatal care. The decision to be tested should be voluntary and based on informed choice.[15]

Saskatchewan: The College of Physicians issued guidelines for physicians to assess a woman's risk and inform her that testing is available.[16]

Alberta: On September 1, 1998, HIV screening was added to the routine prenatal blood tests for all women in Alberta. HIV screening is done unless the woman declines to be tested. Canadian Blood Services laboratories in Calgary and Edmonton do the initial HIV screening on prenatal blood samples received for blood grouping, Rh determination, anti-erythrocyte antibodies and hepatitis B serology. Repeatedly reactive samples are sent for confirmation testing by the Provincial Public Health Laboratories.[17]

British Columbia: In June 1994, the B.C. Ministry of Health recommended that HIV testing be offered as a routine prenatal component, with informed consent and pre- and post-test counseling.[18]

Northwest Territories (NWT): In 1993, the Northwest Territories Maternal and Perinatal Committee, which has representation from the Department of Health and Social Services and the Northwest Territories Medical Association, recommended that all pregnant women be tested for HIV. In 1998, screening for HIV became fully integrated with routine prenatal care, although women are provided the opportunity to opt out.[19]

Nunavut (new territory separated from the NWT in 1999): same policy as in NWT.[20]

Yukon: In 1994, the Chief Medical Officer of Health, in conjunction with Yukon Communicable Disease Control, "strongly recommended" testing of all pregnant women. Women who present for testing are also encouraged to recommend their partner be tested as well.[21]

Canadian Women Can Access Prenatal HIV Screening Programs

Data from prenatal HIV screening programs can provide important information on the effectiveness of prenatal HIV screening recommendations. Below are data from several provinces:

Alberta: During the first year of their program, 4% of a total of 51,500 eligible pregnancies declined testing. These data have found 15 HIV-positive women, for a rate of 2.91/10,000. In the following year, 2.4% of pregnant women declined testing and the HIV prevalence rate was 3.47/10,000.[17]

Quebec: A recent study examined changes in medical practice regarding prenatal HIV testing before and after the 1997 implementation of the Quebec intervention program on HIV infection and pregnancy. The authors found that the proportion of physicians who offered HIV testing to all pregnant women increased from 50% to 83% between 1997 and 1999.[22]

British Columbia: About 55% of pregnant women were tested for HIV in 1995; this proportion was estimated to be up to 80% in 1999 (60% through routine prenatal testing and 20% through groups identified as high risk).[18]

Ontario: An estimated 52% of prenatal specimens were tested for HIV during April 2000 to March 2001. Rates of HIV testing were higher in Ottawa-Carleton (63.0%) and in Eastern/Northern Ontario (58.5%) than in Toronto (50%).[23]

Newfoundland and Labrador: Almost all pregnancies in 2000 (estimated to be 9,000) were tested for HIV and no HIV-positive results were found.[9]

Antiretroviral Treatment Can Reduce the Likelihood of Transmission of HIV from Mother to Infant During Pregnancy

HIV testing during pregnancy can provide the opportunity to offer antiretroviral treatment to the mother and infant. For example, a full AZT protocol, which includes administering AZT to the mother during the second or third trimester, during labor and delivery, and after delivery to the infant for 6 weeks can reduce the likelihood of transmission of HIV from mother to newborn by about 2/3.[24] Clinical trials in developing countries have recently shown that short course AZT regimes (given to pregnant women starting at 36 weeks gestation and during labor) can reduce vertical transmission rates by about 50%.[25] Recent studies indicate that even greater reductions can be achieved using single-dose nevirapine.[26]

In Quebec, at Sainte-Justine Pediatric Hospital, the use of antiretroviral therapy (AZT) reduced the likelihood of mother-to-infant HIV transmission from 28.3% transmission among mother-infant pairs who had not received any AZT, to 3.75% for mother-infant pairs who had received partial or full AZT therapy.[27]

Similarly, a more recent study (1993-1999) on AZT use in B.C. found a reduction in the HIV vertical transmission rate from 28% in untreated women-infant pairs to 13% in partially-treated pairs and 0% in completely-treated pairs.[28]

In Alberta, a study examining the prevention of perinatal HIV transmission from 1998 -1999 found that when HIV-positive mothers were treated with antiretrovirals during pregnancy and intrapartum, 31 of 36 babies (86%) were not HIV infected.[29]

Data from the national surveillance program of Pediatric Centres and HIV clinics in Canada (where 95% of the diagnosed HIV-exposed infants are followed) indicate that the proportion of pregnant women receiving antiretroviral therapy has increased steadily in the last 5, from 37% in 1994 to 53-58% in 1995-1996, 72% in 1997 and 84% in 1998. The resulting perinatal HIV transmission rate was reduced to 4.8% with AZT monotherapy and to 2.5% with combined therapy.30 Recent data from this group indicate that from 1995 - 1999, of the 93 HIV infected infants born during this period, 83 were born to women who did not receive antiretroviral therapy. Most of these women were not offered antiretroviral therapy because their HIV status was not identified before or during their pregnancy.[31]

Canadian Prenatal HIV Screening Programs Are Valuable

Screening pregnant women for HIV clearly represents an important opportunity to prevent the transmission of HIV to infants. From the perspective of a cost-benefit analysis (which includes the costs of screening tests, counseling and treatment), the benefit of screening is

obviously greater in areas with higher HIV prevalence among child-bearing women. For areas of lower HIV prevalence, the benefit per unit cost is more dependent on variables such as whether or not physicians bill separately for the counseling time associated with prenatal HIV testing.[33] It is estimated that if such programs screened 90% of pregnant women across Canada, there would be a 65% reduction in the number of HIV-infected newborns (compared to no prenatal testing and assuming 24% of untreated pregnancies and 6% of treated pregnancies result in HIV-infected infants).[34] Assuming HIV prevalence rates of 6/10,000 among pregnant women in B.C. Ontario and Quebec and 3/10,000 elsewhere, this reduction in absolute number terms would be from 56 to 20 infected newborns, or 36 infections prevented annually.

Comment

There is still a risk for the perinatal transmission of HIV in Canada and as more women are becoming infected, this risk is increasing. Elsewhere, we have estimated that about 15,000 Canadians (including women) are HIV-infected, but unaware of their infection (see *Epi Update* entitled "Prevalent HIV Infections in Canada: Up to One-Third May Not Be Diagnosed", April 2002). Given this, and the fact that perinatal infections are preventable, it is important that all pregnant women, and women considering pregnancy, should have access to prenatal care that includes the offer of HIV testing as well as appropriate counseling and care.

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April 2002

HIV/AIDS
EPI UPDATE
Centre for the Infectious Disease Prevention and Control

At a Glance

- **Aboriginal and Black persons are over-represented among reported AIDS cases in Canada.**
- **Approximately half of all positive HIV test reports among Aboriginal and Black persons are female.**
- **Among positive HIV test reports with ethnicity, close to 60% were IDU among Aboriginal persons, and close to 80% were from heterosexual exposure categories among Blacks.**

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Ethnicity Reporting for AIDS and HIV in Canada

Introduction

Documentation of ethnicity among reported AIDS cases and positive HIV test reports has become an important component of AIDS and HIV surveillance due to the unique perspective it offers on the epidemic. As with other demographic identifiers, ethnic information can contribute to the creation and evaluation of targeted prevention and treatment programs as well as to the development of health policy.

This *Epi Update* presents a summary of ethnic information from the national AIDS and HIV surveillance system. Additional information is available in "HIV and AIDS in Canada: Surveillance Report to December 31, 2001".[1]

AIDS

Improved Ethnicity Reporting Among AIDS Cases

Since 1982, when the first AIDS case was reported in Canada, a total of 85.1% (15,339/18,026) of AIDS case reports have included ethnicity. During this time, the proportion of cases with this information has increased. Between 1982 and 1991, 80.2% of reported AIDS cases indicated ethnicity. This figure increased to 88.8% in the period between 1992-2001. Reporting on ethnicity peaked in 1998 at 93.7%, but has since declined to 87.8% in 2001.

Reported AIDS Cases and Ethnicity: A Balance of Changing Proportions

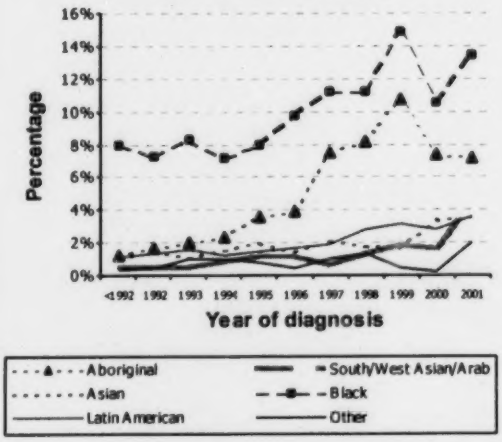
The total number of reported AIDS cases has declined over the last 10 years from 1,724 cases in 1992 to 221 in 2001. The number of cases in some ethnic groups, however, has not declined at the same rate as others. In order to better

understand trends by ethnic status, it is helpful to examine the proportion of all reported AIDS cases attributed to a particular ethnic group.

Whites have historically represented the largest proportion of reported AIDS cases, yet this proportion has declined over the last 10 years. In 1992, the proportion of reported AIDS cases among Whites was 87.2% and in 1996, 81.7%. In 1999, the proportion of cases with known ethnicity dipped to 67.2% among Whites, increased to 74.1% in 2000 and dropped to 66.0% in 2001.

With a decrease among Whites, there has been a corresponding increase in the proportion of reported AIDS cases among other ethnic groups. The increase has been most notable among Aboriginal persons and the Black population since 1994 (Figure 1).

Figure 1: Proportion of Reported AIDS Cases for Selected Ethnic Groups, by year



In 1996, Aboriginal persons and Blacks comprised 2.8% and 2.0% of Canada's population respectively.[2] In 2001, they accounted for 7.2 % and 13.4% of reported AIDS cases, respectively. Assuming the ethnic composition of Canada's population has remained stable since 1996, this indicates that both Aboriginal persons and Blacks are over-represented in reported AIDS cases in 2001.

HIV

Missing Pieces: Positive HIV Tests Often Reported Without Ethnicity Information

Ethnicity reporting for positive HIV test reports is not as complete as that of reported AIDS cases because ethnicity data are available only for some provinces and territories. Reporting of HIV is more recent than AIDS and there is still some concern regarding documentation of confidential information. As a result, the analysis of ethnicity information for HIV test reports presents a challenge.

Ethnicity data for positive HIV test reports have only been available since 1998, and therefore comparisons are possible only for this limited period of time. The proportion of positive HIV test reports with ethnicity information was 26.1% in 1998, 30.5% in 1999, 32.2% in 2000 and 30.9% in 2001.

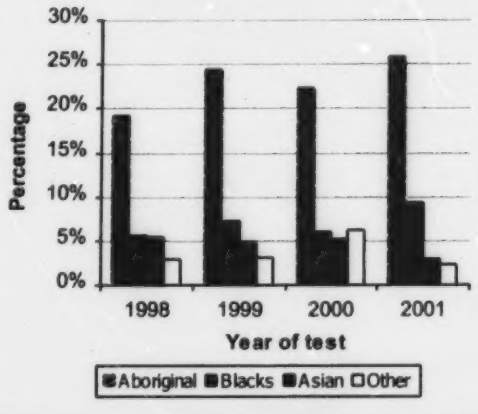
When examining HIV data, it must also be considered that the source of the HIV reports which include ethnicity are some areas where the Aboriginal population is high in comparison with other parts of Canada. Provinces and territories that report ethnic information include British Columbia, Yukon Territory, Alberta, Saskatchewan, Manitoba, Prince Edward Island, and Newfoundland and Labrador. HIV ethnicity data are not available for the remaining provinces and territories. As a result, the ethnicity data for HIV test reports should not be viewed as representative of all of Canada.

Aboriginal Persons Constitute A Notable Proportion of Positive HIV Tests With Known Ethnicity

The majority of positive HIV test reports with ethnicity information are among Whites, similar to the situation seen in reported AIDS cases. Whites represented 66.9%, 60.6%, 60.3% and 59.8% of positive HIV reports with known ethnicity in 1998, 1999, 2000 and 2001, respectively.

In 1998, 19.3% of positive HIV tests with known ethnicity were among Aboriginal persons as compared to 24.3% in 1999, 22.3% in 2000 and 25.9% in 2001 (Figure 2). These proportions are higher than the proportions attributed to Aboriginal persons for reported AIDS cases. For example, in 2001, Aboriginal persons comprised 13.4% of reported AIDS cases. This difference is likely due in part to HIV ethnicity information being primarily from western provinces where the Aboriginal population is greater. For additional information on HIV/AIDS among Aboriginal people, refer to the Epi Update entitled "HIV/AIDS Among Aboriginal Persons in Canada: A Continuing Concern", April 2002.[3]

Figure 2: Proportion of Positive HIV Tests with Known Ethnicity in Selected Ethnic Groups, 1998-2001



Compared to other non-White ethnic groups, Aboriginal persons account for a higher proportion of positive HIV test reports where ethnicity has been recorded (Figure 2). However, one must remember that the two largest provinces, Ontario and Quebec are not represented in the HIV ethnicity data.

Positive HIV Tests Reflect Differences Among Ethnic Groups

Table 1 shows the distribution of gender, age and exposure category among positive HIV test reports for different ethnic groups. Such information may be of assistance in the design and targeting of prevention and care programs.

Table 1: Comparison of Positive HIV Test Reports Between Selected Ethnic Groups, 1998-2001

	White	Aboriginal	Black
Gender	**n = 1620**	**n = 605**	**n = 184**
Male	83.2%	54.3%	50.0%
Female	16.8%	45.6%	50.0%
Age (Years)	**n = 1631**	**n = 605**	**n = 186**
20-29	17.4%	30.6%	37.1%
30-39	40.1%	39.3%	37.6%
40-49	27.7%	21.2%	15.1%
Exposure Category	**n = 1561**	**n = 578**	**n = 179**
MSM	36.9%	8.3%	7.3%
IDU	32.8%	59.7%	8.4%
HET	20.4%	24.9%	77.1%

MSM = Men who have sex with men; IDU = Injecting Drug Users; HET = Heterosexual Risk (Originate from a Pattern II country, Sexual contact with a person at risk, No Identified Risk Heterosexual). Subtotals differ due to unknown gender, age and exposure in some reports. Provinces with ethnicity reported include BC, YK, AB, SK, MB, PEI, NFLD and Labrador).

As shown in Table 1, available evidence suggests that among Aboriginal persons and the Black population, in contrast to Whites, positive HIV test reports are equally distributed between males and females and there is a higher proportion at a younger age.

Injecting drug use has been a key mode of transmission among Aboriginal persons. As shown in Table 1, injecting drug users comprised 59.7% of positive HIV test reports among Aboriginal persons during 1998-2001. Among Whites, the highest proportion of positive HIV test reports was attributed to men who have sex with men (36.9%) and injecting drug users (32.8%). People whose HIV infection was attributed to heterosexual exposure represented the largest proportion of positive HIV test reports among the Black population (77.1%). The majority of these are categorized to the subgroup indicating origin in Pattern II country (a country where heterosexual transmission of HIV predominates).

Limitations of Ethnicity Data from Reported HIV and AIDS Cases

There are several significant limitations regarding the accuracy of ethnicity data obtained from AIDS and HIV surveillance information. The following should be kept in mind when examining such data:

Misclassifications of ethnic status may occur at the time of HIV or AIDS diagnosis.

- People in certain communities may not wish to identify their ethnicity, resulting in under-representation.
- For AIDS reporting, patients and health care providers are constrained by the list of ethnic categories available on the AIDS Case Report Form which may compromise the accuracy of ethnicity reporting.
- Not all provinces and territories routinely collect and/or report ethnicity.
- Variations in the completeness of ethnicity reporting between and within provinces may result in a systematic over-or under-representation of specific communities.
- Reporting delay may vary by ethnicity, and may therefore affect the representativeness of ethnicity data for recently reported HIV and AIDS cases.

Given these limitations, caution should be exercised in interpreting the AIDS and HIV ethnicity data presented. This is particularly true of positive HIV test reports for which there is less complete ethnicity information.

Comment

Ethnicity data on HIV/AIDS may be used by community health groups and public health officials to more effectively plan prevention and care programs for the different ethnic communities. When combined with other epidemiologic descriptors of the HIV/AIDS epidemic, such as gender, age group, and exposure category, such information becomes a powerful tool for directing programs to where they will have the most impact. To increase our ability to do this, it is essential that the completeness and accuracy of ethnicity reporting in surveillance data be improved.

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April 2002

HIV/AIDS
EPI UPDATE
Centre for the Infectious Disease Prevention and Control

At a Glance

- **The proportion of AIDS cases attributed to Aboriginal persons has declined since 1999, yet the proportion of positive HIV test reports attributed to this ethnic group continues to increase.**
- **Injecting drug use is the main exposure category among Aboriginal HIV/AIDS cases reported to CIDPC.**
- **A high proportion of HIV- infected pregnant women are Aboriginal.**

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HIV/AIDS Among Aboriginal Persons in Canada: A Continuing Concern

Introduction

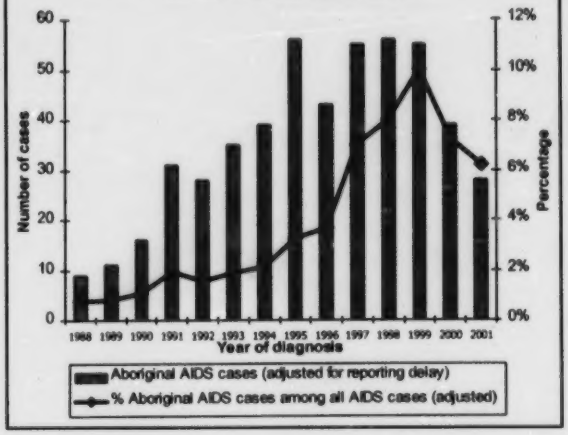
In Canada, the Aboriginal populations are very diverse with many sub-groups (First Nations, Inuit and Metis) that reflect variations in historical backgrounds, language and cultural traditions. These groups represent 2.8% of the Canadian population.[1] However, they are disproportionately affected by many social, economic and behavioral factors (such as high rates of poverty, substance abuse, sexually transmitted diseases, limited access to or use of health care services) which increase their vulnerability to HIV infection. Hence, in recent years, an increase in the HIV/AIDS epidemic has been observed in some Aboriginal communities, particularly those in inner-cities. This report updates current information on the status of the HIV/AIDS epidemic among Aboriginal persons in Canada.

Pattern of AIDS is Different among Aboriginal Persons

Increasing Trend Over Time

- As of December 31, 2001, there have been 18,026 AIDS cases reported to the Centre for Infectious Disease Prevention and Control (CIDPC) in Canada.[2] Of that total, 437 were reported as Aboriginal persons (17 Inuit, 34 Metis, 354 Native Indians (i.e. First Nations), and 32 Aboriginal unspecified).

Figure 1: Annual number and percentage of Aboriginal AIDS cases adjusted for reporting delay, Canada, 1988-2001


Number of cases
Percentage
Year of diagnosis
Aboriginal AIDS cases (adjusted for reporting delay)
% Aboriginal AIDS cases among all AIDS cases (adjusted)

- After adjusting for reporting delay, the annual number of AIDS cases increased in the 1990's (Figure 1). This trend contrasts with the trend in the overall number of delay-adjusted AIDS cases which declined after 1994 (see HIV and AIDS in Canada: Surveillance Report to December 31, 2001).[2] The annual proportion of AIDS cases attributed to Aboriginal persons increased from less than 1.0% before 1990 to 10.0% in 1999. Recent estimates of the proportion of Aboriginal AIDS cases adjusted for reporting delay have indicated a decrease from 1999 to 6.22% in 2001 (Figure 1), although more data are need to confirm this trend.

Injecting Drug Use among Reported AIDS cases - A Major Risk Factor

- There have been 334 Aboriginal males with a reported AIDS diagnosis up to December 31, 2001. Of those with known exposure, 47.7% were men who have sex with men (MSM), 26.9% were injecting drug users (IDU), 12.2% were MSM/IDU, 10.7% were at risk through heterosexual contact, 0.9% had received blood/clotting factors and 1.5% were infected though perinatal transmission.

- There were 102 Aboriginal women with a reported AIDS diagnosis up to December 31, 2001. Among those with known exposure, 64.9% were IDU, 30.9% at risk through heterosexual contact, 2.1% had received blood/clotting factors, 2.1% were infected through perinatal transmission.

- The proportion of reported Aboriginal AIDS cases attributed to injecting drug use has dramatically increased over time, from 10.3% prior to 1992 to 29.5% during 1992-1996 and 52.9% during 1997-2001.[2]

The proportion of females and the proportion less than 30 years old among reported Aboriginal AIDS cases are higher than among non-Aboriginal AIDS cases. (Table 1) Also, there is a higher proportion of Aboriginal AIDS cases that are IDU as an exposure category compared to non-Aboriginal cases (35.5% vs 6.0%).[2]

Table 1: Gender, Age and Injecting Drug Use among Aboriginal and Non-Aboriginal Reported AIDS Cases up to December 31, 2001

	Aboriginal	Non-Aboriginal
Female	23.4%	8.0%
<30 years old	24.9%	17.2%
IDU exposure category	35.5%	6.0%

HIV Surveillance Data

- While AIDS data provide information on HIV infections that occurred about 10 years in the past, HIV data provide a picture of more recent infections.

- Positive HIV reports from provinces with ethnicity reporting (British Columbia, Yukon Territory, Alberta, Saskatchewan, Manitoba, Prince Edward Island, and Newfoundland and Labrador) indicate that Aboriginal persons were over-represented among new HIV diagnoses, i.e. 19.3% in 1998, 24.3% in 1999, 22.3% in 2000 and 25.9% in 2001.

- Table 2 shows the distribution of gender, age, and exposure category among positive HIV test reports from 1998-2001 for Aboriginal

and non- Aboriginal persons. Females represent nearly half (45.6%) of all positive HIV test reports among Aboriginal persons, however females represent 19.8% of reports for non-Aboriginal persons. In addition, compared to non-Aboriginal persons, a higher proportion of Aboriginal persons test positive for HIV infection at a younger age. Although proportions are comparable for HIV infection through heterosexual transmission, Aboriginal persons have a higher proportion of reports attributed to IDU and a smaller proportion to MSM.[2]

Table 2: Gender, Age and Exposure Categories among Reported HIV Tests, Aboriginal vs Non-Aboriginal Persons in Provinces with Reported Ethnicity, 1998-2001**

	Aboriginal	Non-Aboriginal
Gender	**n = 605**	**n = 2,019**
Male	54.4%	80.2%
Female	45.6%	19.8%
Age (years)	**n = 605**	**n = 2,031**
20-29	30.6%	20.4%
30-39	39.3%	39.8%
40-49	21.1%	25.5%
Exposure Category	**n = 578**	**n = 1,953**
MSM	8.3%	33.7%
IDU	59.7%	29.0%
Heterosexual	24.9%	27.0%

** BC, YK, AB, MB, SK, PEI, NFLD and Labrador

Aboriginal persons over-represented among IDU

IDU continue to be an important risk group in the Canadian HIV epidemic. Recent evidence supports the trends seen in surveillance data suggesting that injecting drug use in a particularly important risk factor for HIV among Aboriginal persons.

- The Vancouver Injection Drug Users Study (VIDUS) is an open cohort that enrolled over 1,400 IDU between May 1996 and May 2000. Results showed that 25% of participants were Aboriginal persons, more than half of whom were female (54% female, 46% male). In contrast, females accounted for 29% of Non-Aboriginal participants.[3]

- In a further analysis of the VIDUS study, investigators found that Aboriginal status was significantly associated with new HIV infection, separately in both men and women[4] and also among study participants 24 years of age or younger.[5]

- In a study of Calgary's Needle Exchange Program, most participants were Caucasian (75%), however Aboriginal persons were the second highest ethnic group, representing 20% of total participants.[6]

- A recent study of IDU's in Regina, Saskatchewan indicated that of the 255 participants, 90% self-identified as an Aboriginal person.[7]

Aboriginal Women and Children

- Infected pregnant women are at risk for transmitting HIV to their unborn child. Recent data from some sites in western Canada have shown that a high proportion of HIV-infected pregnant women who deliver are Aboriginal. Among all pediatric centres across Canada where children and HIV-infected mothers were followed between 1995-1997, 19% (n=259) were Aboriginal women.[8] Of 32 HIV-infected women who delivered in Northern Alberta or the NWT in 1996-98, 29 (91%) were Aboriginal.[9]

- Despite high numbers of Aboriginal women seen at HIV clinic and pediatric centres, there was encouraging news that during the period 1995-1997, pregnant Aboriginal women (62%) were as likely to be on antiretroviral therapy as pregnant Caucasian women (66%) and pregnant Black women (63%).[10]

- In a recent study of antiretroviral therapy in a cohort of HIV-positive pregnant women recruited in 7 sites in Ontario, Manitoba and Saskatchewan, results show that 20% of

women were Aboriginal. Late use of antiretroviral therapy (in third trimester or intraparturm) was unequally distributed by ethic status occurring in 38% of Aboriginal, 27% of Black and 9% of White women.[11]

Aboriginal Men who Have Sex with Men

- A study done among MSM in Winnipeg in 1995 found that 17% were Aboriginal persons.[12]

- The proportion of Aboriginal participants was 41% in a recent cross-Canada study (1999-2000) among male street youth who reported having sex only with men.[13]

- In an ongoing study (1996-present) among young MSM in Vancouver, 8% of participants were Aboriginal men. These Aboriginal MSM were more likely than non-Aboriginal MSM to be unemployed, to live in unstable housing, to have higher depression scores, to report non-consensual sex or sexual abuse during their childhood, and to be involved in the sex trade.[14]

Aboriginal Inmates

- Across Canada, 14% of federal inmates are Aboriginal persons, with rates up to 40% in provincial or federal jails in some provinces.[15-17]

Increasing Proportion of Aboriginal Persons among Estimated HIV Prevalent and Incident Infections at the National Level

- According to the latest estimates of HIV prevalence and incidence produced by CIDPC, the number of Aboriginal persons living with HIV has increased from 1,430 in 1996 to 2,740 in 1999 (91% increase during the 3 year period).[18] The estimated number of incident infections among Aboriginal persons increased from 310 in 1996 to 370 in 1999. Although Aboriginal persons comprise only 2.8% of the general Canadian population, they accounted for 5.5% (2,740/49,800) of all prevalent infections and 8.8% (370/4,190) of all new infections in Canada in 1999. The estimated exposure category distribution of prevalent and incident infections among Aboriginal persons in 1999 is shown in Table 3.[18] Injecting drug use is the predominant risk factor for HIV infections among Aboriginal populations representing an estimated 54% of prevalent infections and 64% of incident infections in 1999. When the exposure category MSM/IDU is included, these proportions increase to 60% and 72%, respectively.

Table 3: Estimated Exposure Category Distribution among prevalent and incident HIV infections among Aboriginals in Canada, 1999

Exposure category	Prevalent infections (n=2,740)	Incident infections (n=370)
IDU	54%	64%
Heterosexual contact	15%	17%
MSM	23%	11%
MSM/IDU	6%	8%

Comment

Aboriginal HIV and AIDS data are incomplete for several reasons. The major reason is the incomplete ethnic information in current surveillance data; since 1982, 93% of positive HIV test reports and 15% of reported AIDS cases have had no ethnic information. Other reasons include inter-provincial variations in reporting ethnicity, misclassification of ethnic status, and delays in reporting.

With respect to positive HIV test reports among Aboriginal persons, they only represent those infected individuals who came forward for testing and are subsequently reported. Therefore, the numbers do not represent the total number of Aboriginal persons infected with HIV.

Despite these limitations, available evidence suggests that Aboriginal persons are infected at a

younger age than non-Aboriginal persons, that injecting drug use is the most important mode of transmission, and that the HIV epidemic among the Aboriginal community shows no sign of abating. Furthermore, the mobility of Aboriginal persons between inner cities and rural areas may bring the risk of HIV to even the most remote Aboriginal community. Better data on HIV/AIDS epidemiology and HIV testing among Aboriginal persons in Canada are needed to guide prevention and control strategies.

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April 2002

HIV/AIDS
EPI UPDATE
Centre for the Infectious Disease Prevention and Control

At a Glance

- **In Canada, MSM account for 77.9% of cumulative AIDS cases among adult males.**
- **MSM account for 71.3% of positive HIV test reports among adult males since testing began in 1985.**
- **An increase in rates of new HIV infection among MSM has been observed in Toronto and Vancouver.**
- **The observed level of risk behaviours among MSM could result in a significant increase in new HIV infections in Canada.**

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HIV Infections Among MSM In Canada

Introduction

In Canada, the HIV/AIDS epidemic has had a tremendous impact on men who have sex with men (MSM). Even though the toll of the epidemic no longer affects MSM to the same extent that it did in the early-to-mid 1980s, this group still accounts for the largest number of HIV and AIDS case reports. Recent data on HIV incidence and risk behaviors suggest that MSM continue to be at risk for HIV infection and other sexually transmitted diseases (STDs). This report updates the current information on the status of HIV and AIDS among MSM in Canada.

AIDS Surveillance Data

- As of December 31, 2001, the Centre for Infectious Disease Prevention and Control (CIDPC) reported a cumulative total of 18,026 AIDS cases. Of the 16,407 adult male AIDS cases, 77.9% were attributed to MSM and an additional 5.0% were attributed to the combined group MSM and injecting drug use (MSM/IDU).[1]
- Figure 1 shows a steady decrease in the proportion of adult AIDS cases attributed to MSM reported to CIDPC from 1986-1999. In 2000, this proportion increased to 48.9% and has decreased to 44.6% in 2001. The annual number of AIDS cases attributed to MSM (unadjusted for reporting delay) peaked in 1992-1994, decreased sharply during 1995-97, began to level off in 1999-2000, and decreased again in 2001.[1]

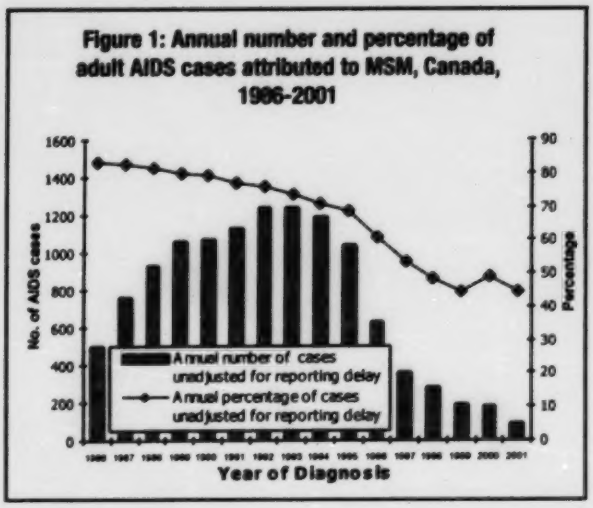
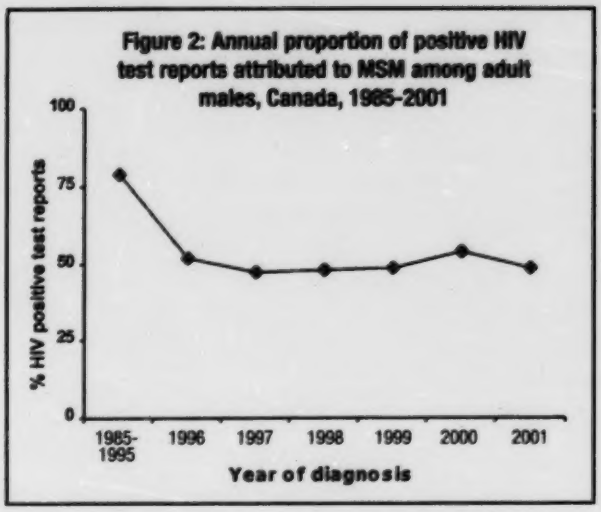


Figure 1: Annual number and percentage of adult AIDS cases attributed to MSM, Canada, 1986-2001
No. of AIDS cases
Percentage
Annual number of cases unadjusted for reporting delay
Annual percentage of cases unadjusted for reporting delay
Year of Diagnosis



- The proportion of adult AIDS cases attributed to MSM who are also injecting drug users (MSM/IDU) has remained relatively steady, varying between 3.0 and 5.4% during the last 6 years. The proportion of AIDS cases attributed to MSM/IDU among adults was 3.0% in 2001.[1]

HIV Surveillance Data

While AIDS data provide information on HIV infection that occurred about 10 years in the past, HIV data provide a picture of more recent infections.

- Data from provincial HIV testing programs, collated and synthesized at the national level by CIDPC, shows that prior to 1996, 79% of positive HIV test reports among adult males were attributed to MSM. (Figure 2) This proportion decreased steadily to level off at around 48% during 1997-1999. It increased to 53.6% in 2000 and then decreased to 48.5% in 2001.[1]

- A similar trend is observed in the absolute number of positive HIV test reports among adult males attributed to MSM: a steady decline to 420 reports in 1999, an increase to 466 in 2000, and a decrease to 399 cases reported in 2001. The year 2000 was the first time an increase has been seen among MSM test reports in the HIV surveillance data since the 1980s.[1]

Increasing rate of new HIV infections in some parts of Canada

- Data from Ontario show a recent increase in the rate of new HIV infections among MSM who are repeat testers for HIV, from 0.86 infections per 100 person-years in 1996 to 1.18 during 1997-98 and 2.56 in 1999. The rate was particularly high in Toronto (3.5 in 1999).[2] A similarly high rate of HIV infections among MSM was found in another study based on a different method. Using a new laboratory technique to identify recent infections among those newly diagnosed for HIV during 1999-2000, Remis and colleagues calculated an incidence rate of 2.6 for Ontario MSM and 3.8 for Toronto MSM during this period.[3-4]

- In Quebec, the Omega Cohort provides information on the incidence and psychosocial determinants of HIV infection among MSM living in Montreal. The incidence rate in the Montreal cohort declined from 0.78 per 100 person-years in 1997 to 0.34 in 2000. However, this decline was not statistically significant.[5]

- In British Columbia, results from the Vanguard study, a prospective cohort of young gay and bisexual men in Vancouver, have shown that the rate of new HIV

infections among men who had never injected drugs has increased from 0.6 per 100 person years in 1995-99 to 3.7 per 100 person years in 2000.[6-9]

- With respect to HIV prevalence, data (self-reported or tested) from surveys done directly among MSM showed a very high rate before 1990: 23-32% in Vancouver;[10-11] 27-57% in Toronto;[10,12] 20-25% in Montreal;[10,13] and between 10-20% in other regions of Canada.[10] By 1998/2000, it appeared that there was some decline in HIV prevalence rate among MSM surveyed by similar methods (e.g. 16% in Vancouver,[14-15] 10-15% in Montreal).[16-17] However, we still observe a high prevalence rate among MSM who are also injection drug users, for example, 23-28% among MSM/IDU attending needle exchange programs in Ontario (1991-1994)[18] and 14-22% among those in Quebec (1995-2000).[19-20]

- In the Omega Cohort, results found that HIV prevalence increased with age from a rate of 0.0% in MSM under 20 years, to 3.1% in those aged 40-44 years, and then decreased to 0.4% among those 45 years of age or over. However, this trend was not statistically different.[5]

Continuing Risk Behavior Among MSM

Recent data on risk behaviours suggest that MSM continue to be at considerable risk for HIV infection and other STDs by engaging in unprotected anal intercourse (receptive or insertive UAI) with casual or regular partners, or practicing unsafe sex (oral or anal) with a known HIV positive partner:

- It is estimated that around 15% of Montreal's MSM are currently HIV infected. Results from the Montreal Omega Cohort Study indicate that 12% of MSM practice UAI with casual partners. This could result in a significant increase in the risk of new HIV infections.[21]

- In another survey in Montreal, the prevalence of reported UAI was 12% among MSM recruited in bars or saunas, but was up to 21-24% among MSM who were HIV-positive.[16-17] About 4% of the 500 surveyed man reported having consensual unprotected anal sex with a HIV-positive male partner.[17]

- With respect to relapse to risky behaviors, available data indicate that 10% of the Montreal cohort and 26-30% of the Vancouver cohort who reported safe sex at baseline, disclosed relapse to unprotected anal sex at follow-up six to twelve months later.[6-7]

- Data from the Montreal cohort and the Vancouver cohort were combined and analyzed, comparing the sexual behaviours for HIV-positive and HIV-negative gay and bisexual men, aged 16-30 years. Results show that 56% of HIV-positive men and 40% of HIV-negative men reported having engaged in receptive UAI during the previous 6 months or year.[22]

- STD data may be used as a marker for unsafe sexual behavior. Preliminary data for 1999-2000 show increased reports of rectal gonorrhea among adult males in Toronto and Ottawa compared to earlier years, and a potential outbreak of syphilis among MSM in Calgary.[23] These data suggest increases in unprotected sexual encounters among MSM that corroborate the increases in estimated HIV incidence.

Comment

A number of biases must be taken into account when interpreting the results noted above. HIV diagnostic data are limited to persons who present themselves for testing and so trends in these numbers may be influenced by testing patterns or improved ability to remove duplicate tests. In addition, identifying information that accompanies HIV testing data is sometimes incomplete or inaccurate, and this may limit the usefulness of HIV incidence estimates derived from repeat-tester data. Results of cohort studies are limited by selection biases, loss to follow-up, and problems with generalizability.

Despite these limitations, available data suggest that there is an increase in HIV infections among MSM in 1999-2000 compared to immediately preceding years, at least in some parts of Canada. In fact, CIDPC has recently estimated that annual HIV infections among MSM in Canada have increased from about 1,240 in 1996 to 1,610 in 1999 (see Epi Update entitled "National HIV Prevalence and Incidence Estimates for 1999: No Evidence of a Decline in Overall Incidence", April 2002).

Similar data indicating increasing infections among MSM, or the potential for an increase, have been noted elsewhere. For example, increases have been seen in HIV incidence among MSM in San Francisco,[24] and in HIV-associated risk behaviours and/or STDs among MSM in the USA,[25-27] Amsterdam,[28] and Sydney, Australia.[29]

Several hypotheses might explain these increases in HIV infections and associated risk behaviours, including: feelings of complacency or optimism related to the success of antiretroviral therapy,[23] false reassurance upon learning an HIV-negative result, a lack of direct experience of the AIDS epidemic among the younger generation of gay men, a desire to escape the rigorous norms and standards required for a lifetime of safe sex,[2, 30-31] alcohol/drug use[32-34] and the impact of internet chat rooms as a risk environment.[35]

Taken together, the recent findings indicate that HIV infections increased among MSM in some parts of Canada during 1999-2000. It is not yet clear whether this trend has continued in 2001. Nonetheless, there is a clear need for innovative prevention programs to reduce the spread of HIV and also STD among the gay community. National risk behaviour measures over time would be useful to better characterize the epidemic among MSM and to support effective prevention programs. If antiretroviral therapy becomes less effective because of the viral resistance, the actual level of risk behaviour could significantly increase the incidence of HIV.

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April 2002

HIV/AIDS
EPI UPDATE
Centre for the Infectious Disease Prevention and Control

At a Glance

- **The proportion of reported adult AIDS cases attributed to injecting drug use has decreased from a peak of about 20% in 1998-2000 to 14.4% in 2001.**
- **IDU account for 16.2% of cumulative positive adult HIV test reports up to December 31, 2001.**
- **From 1996 to 1999, the estimated number of annual HIV infections among IDU in Canada decreased from 1,970 to 1,430.**
- **Despite a slight drop in national HIV infections among IDU, the absolute number of infections in this group remains unacceptably high.**

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HIV/AIDS Among Injecting Drug Users in Canada

The Canadian HIV epidemic in the early 1980s was concentrated among men who have sex with men (MSM). In the early-to-mid 1990s, there was a change toward increasing transmission among injecting drug users (IDU) such that in 1996, approximately 47% or 1,970 of the estimated 4,200 new HIV infections that occurred in Canada that year were among IDU.[1] Although the national HIV estimates for 1999 show a slight drop in the number of new infections among IDU (1,430 of a total of 4,190[2]), HIV and AIDS among IDU in Canada remain a major problem. This report updates information on the status of the HIV/AIDS epidemic among IDU in Canada.

Injecting Drug Use Remains a Significant Exposure Category among AIDS Cases

- As of December 31, 2001, 18,026 cumulative AIDS cases had been reported to the Centre for Infectious Disease Prevention and Control (CIDPC).[3] Of the 17,186 adult AIDS cases with known exposure category information, 6.8% (1,162) were attributed to injecting drug use and 4.6% (787) to men who have sex with men who are also IDU (MSM/IDU).
- After steadily increasing to a peak of just over 20% in 1998- 2000, the proportion of adult AIDS cases attributed to injecting drug use has decreased to 14.4% in 2001(Figure 1).

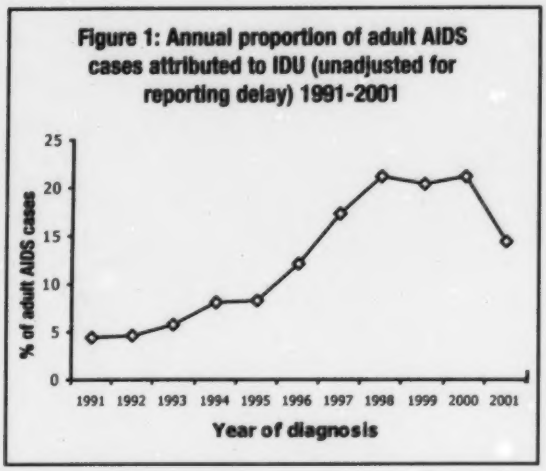
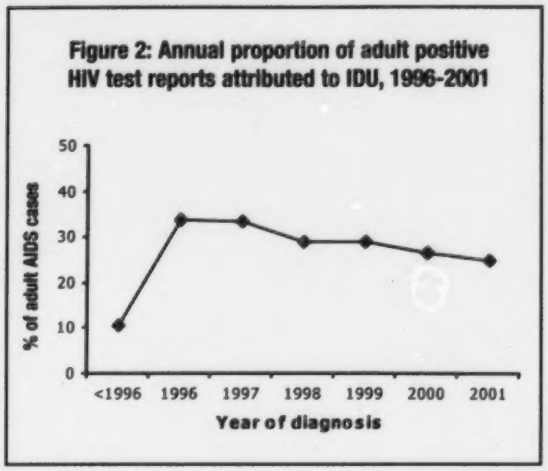


Figure 1: Annual proportion of adult AIDS cases attributed to IDU (unadjusted for reporting delay) 1991-2001
% of adult AIDS cases
25
20
15
10
5
0
1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001
Year of diagnosis



- Of the 1,162 adult AIDS cases attributed to injecting drug use as of December 31, 2001, 73% were males and 27% were females. The proportion of adult male AIDS cases attributed to injecting drug use steadily increased from 3.4% in 1991 to a peak of 19.5% in 2000. This proportion decreased to 15.6% in 2001. The proportion of adult female AIDS cases attributed to injecting drug use increased steadily from 19.4% in 1991 to a peak of 45.5% in 1998. The proportion declined to just under 35% in 1999/2000 and dropped to 9.1% in 2001. (It should be noted that this latter proportion is based on a relatively small number of cases).

A Slight Decline in the Proportion of HIV Positive Test Reports among IDU

While AIDS data provide information on HIV infections that occurred about ten years in the past, HIV data provide a picture of more recent infections.

- As of December 31, 2001, of the 24,948 positive HIV tests reported among adults to CIDPC since 1985, with exposure category information, 16.2% were attributable to injecting drug use. An additional 2.3% were attributed to the combined category of MSM who also inject drugs.[3]

- Figure 2 shows the proportion of adult positive HIV tests attributed to injecting drug use. Prior to 1996, the proportion was 10.7%. This proportion increased substantially to 29.5% in 1995 and peaked at just over 33% in 1996 and 1997. Since 1997, the proportion of reported positive HIV tests attributed to injecting drug use among adults has gradually decreased to 24.6% in 2001.

- The proportion of IDU among adult female positive HIV test reports was 39.6% in 2000 and has decreased to 31.6.% in 2001. The corresponding figures among adult male test reports have remained stable at 22.5% in 2000 and 22.4% in 2001.[3]

- Among positive HIV test reports attributed to injecting drug use in 2001 with age information, the highest proportion was among those aged 30-39 years (42.2%).[3]

HIV Incidence and Prevalence Remain Unacceptably High among IDU

- The SurvIDU study has been ongoing since 1995 and consists of centres providing needle exchange services to IDU in the province of Quebec, plus Ottawa, Ontario. Results indicate that HIV incidence among repeat service attendees in the overall network has not decreased, being 4.7 per 100

person-years in 1997, 4.7 in 1998, 4.2 in 1999 and 5.3 in 2000.[4] Overall incidence in 2000 ranged from 3.8 per 100 person years in semi-urban sites, to 6.0 per 100 person years in Montreal and 7.2 per 100 person years in Ottawa.[5]

- The St Luc cohort study of IDU in Montreal found an HIV incidence of 3.5 per 100 person-years for the period January 1998 to April 2000. HIV incidence among participants in this study has remained relatively stable, with an overall incidence rate of about 4 per100 person years since the study began in 1988.[4]

- The POLARIS study investigated HIV incidence according to risk category among repeat testers in Ontario's diagnostic HIV-testing database during the period 1992-1999. HIV incidence among IDU decreased from 0.57 per 100 person-years in 1992 to 0.26 per 100 person-years in 1997 and then increased to 0.65 per 100 person-years in 1999.[6]

- Results from the Vancouver Injection Drug Use Study (VIDUS) showed that HIV incidence was 1.5 per 100 person-years in 2000, down from 10.3 in 1997 and 3.2 in 1999.[7]

- Results from the Winnipeg Injection Drug Epidemiology (WIDE) Study suggest that the prevalence of HIV infection among IDU in that city increased from 2.3% in 1986-90 to 12.6% in 1998.[8]

- A 1999 seroprevalence survey among 159 IDU using the needle exchange program (NEP) in Victoria, B.C., showed that 21% were HIV-positive. This was significantly higher than the prevalence of about 6% found in a small study of NEP attendees in the same city in the early 1990s.[9]

- Research conducted by Calgary's Needle Exchange Program, Safeworks, shows that the prevalence of HIV among IDU attending that city's NEP has increased from 2.2% in 1992 to 3.3% in 1998.[10,11]

- Results from the SurvIDU study showed that overall HIV prevalence among study participants from 1995 to 2000 was 14.5 per 100 person years (range was 20.1% in Ottawa and 16.7 in Montreal to 4.7% in semi-urban sites).[5]

Women, Youth and Aboriginal IDU Are Particularly at Risk for HIV Infection

- Since 1996, approximately one third to one half of new HIV test reports among women have been attributed to injecting drug use. The latest national HIV estimates published by CIDPC for 1999 indicate that an estimated 54% of all new HIV infections among women were attributed to this exposure category.[2]

- High HIV incidence rates were found among young IDU when the VIDUS study in Vancouver examined rates of HIV positivity among IDU participants who were 24 years of age and younger. HIV incidence rates in this age group were 2.96 for males and 5.69 for females per 100 person years,[12] compared to an overall incidence rate of 1.5 per 100 person years in 2000.[7]

- The HIV incidence among street youth in the Montreal Street Youth Cohort Study was 0.72% in 1999. Factors most strongly associated with seroconversion were having sex with an HIV-positive partner and having injected drugs.[13]

- Results from Phase II of the Enhanced Surveillance of Canadian Street Youth Study showed that 20% of participants (n=1,733) had ever injected drugs. There was

considerable regional variation with 10% of participants in Halifax, to 30% of participants in Saskatoon, to 35% of participants in Vancouver reporting a history of injecting drug use.[14]

- Aboriginal persons are over-represented among IDU populations, and a larger proportion of Aboriginal HIV and AIDS cases are attributed to injecting drug use than non-Aboriginal cases.[15] The 1999 national HIV estimates indicate that 64% of all new HIV infections among Aboriginal people in 1999 were attributable to injecting drug use.[2]

Comment

A number of biases must be taken into account when interpreting the results noted above. HIV diagnostic data are limited to persons who present themselves for testing, and so trends in these numbers may be influenced by testing patterns or improved ability to remove duplicate tests. In addition, identifying information that accompanies HIV testing data is sometimes incomplete or inaccurate, and this may limit the usefulness of HIV data. Results of cohort studies are limited by selection biases, loss to follow-up, and problems with generalizability. Studies that have a cross-sectional design have their own respective limitations.

Despite these issues, available data show that the HIV epidemic among IDU in Canada continues to be a very serious problem, with the infection spreading in vulnerable populations and across geographic boundaries. Although the problem is best documented in larger cities, increasingly, it is now being seen outside major urban areas. Additional epidemiologic data are needed to better define the extent of the problem and to guide the development and refinement of effective prevention policies and programs. These data are especially needed for areas outside major urban areas and for Aboriginal populations. Given the geographic mobility of IDU and their social and sexual interaction with non-users, the dual problem of injecting drug use and HIV infection is one that ultimately affects all of Canadian society.

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HIV/AIDS
EPI UPDATE
Centre for the Infectious Disease Prevention and Control

At a Glance

- **Available data indicate that the sharing of drug injecting equipment remains unacceptably high among IDU.**
- **Research suggests that IDU engage in high levels of unprotected sexual intercourse.**
- **Behavioural trend data are needed to reliably interpret changes in HIV incidence and prevalence among IDU, and to help evaluate prevention programs targeting this population.**

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Risk Behaviours Among Injecting Drug Users in Canada

Introduction

In 1999, 34.1% of the estimated 4,190 new HIV infections that occurred in Canada were among injecting drug users (IDU).[1] In contrast, 46.7% of the estimated 4,200 incident HIV infections that occurred in 1996 were among IDU.[2] Despite a slight drop in the estimated new infections among IDU in this time period, HIV among injecting drug users remains a major problem. In the absence of a vaccine for HIV, behaviour change remains the main tool for preventing HIV infection among drug injectors. Behaviour change concerns both IDU who are HIV-infected and those who are uninfected, and relates mainly to their injecting-related and sexual behaviour. This *Epi Update* briefly describes the drug injecting and sexual risk behaviours that have been reported for IDU in Canada.

Neither a Borrower Nor a Lender Be: The Sharing of Drug Injecting Equipment

The sharing (borrowing and lending) of needles and syringes is well-established as a means of acquiring HIV infection and is common among IDU:

- A study of IDU in Regina in 2000 found that 30% of respondents reported borrowing used needles or syringes in the past six months.[3]
- A cohort study of IDU in Vancouver showed that 27.6% of the participants reported sharing needles in previous six month period (administered during January 1999 to

October 2000). Furthermore, 19.1% of the participants reported that they had shared even though they did not report having difficulty obtaining new, sterile needles.[4]

- Results from the SurvIDU study show that the prevalence of needle borrowing in the past six months among first time NEP attendees in Montreal has decreased from 45.1% to 34.9%, and among repeat attendees in Quebec City, needle borrowing has declined from 43.4% to 34.8%. While these results suggest that positive trends in sharing behaviour among IDU may be occurring in these jurisdictions, the proportions of participants who report sharing needles are still relatively high.[5]

The borrowing and lending of other injecting equipment (e.g., spoons, filters, and water), often referred to as "indirect sharing," have also been found to be associated with HIV infection. Research indicates that indirect sharing also occurs frequently among IDU:

- Results from the Ottawa arm of the SurvIDU study showed that 42.0% of IDU shared equipment other than needles in the past six months, and 20.0% shared only such equipment.[6]

- In the Regina IDU study, 44% of participants reported borrowing used injecting equipment in the past six months. The most common item borrowed was a spoon (cooker), reported by 37% of participants, followed by needles (29%), cotton (27%), and water (24%). Forty two percent of participants also reported lending any injecting equipment in the past six months.[3]

- In a 1998 study in Prince Albert, Saskatchewan, 30.0% of current drug injectors (i.e., those who had injected drugs in the six months prior to the study) had borrowed cookers in the past six months, and the proportions that had borrowed filters and water in this same time period were 26.2% and 27.1% respectively.[7]

- International studies[8,9,10] of IDU have identified other aspects of drug injecting, such as "front-loading" or "back-loading", that may also increase the risk of HIV transmission (These are practices where two or more IDU use only one syringe to prepare a drug solution. The solution is then squirted into one or more additional syringes either via the front of the recipient syringe after removing its needle (front-loading), or via the back after removing the plunger (back-loading). However, the full extent of such risk behaviours among Canadian IDU is still under investigation.

Risky Business: Trading Unprotected Sex for Money and Drugs

Many IDU in Canada are involved in the commercial sex trade and often engage in unprotected sex with clients:

- Among IDU in a cohort study in Montreal, 18.1% of males reported that they had ever been a prostitute.[11]

- In a 1998 study in Winnipeg, 71.5% of female IDU and 30.2% of male IDU reported that they had ever been paid for sex. Among females, 25.0% used condoms inconsistently with their sex trade clients. Among men with male clients, 52.0% reported inconsistent condom use.[12]

Not Safe Enough: Sex with Regular and Casual Partners

Among IDU with regular and casual opposite-sex partners, condom use is also low:

- In the 1998 study of IDU in Winnipeg, 68.0% of women and 57.0% of men who had had regular partners in the past year reported

that they never used condoms. Of those who reported having had casual partners in this time period, approximately 30.0% of both men and women never used condoms.[12]

- Among IDU in the 2000 Regina study, condom use with regular and casual partners was low. For example, 94% of male IDU and 92% of female IDU reported inconsistent or no condom use during vaginal sex with regular, opposite-sex partners. Of those respondents who had casual partners, 58% of men and 71% of women reported inconsistent or no use of condoms with this type of partner.[3]

Same Sex Partners and Male IDU

A substantial minority of male IDU report sexual intercourse with same sex partners:

- Among male IDU in a Vancouver study who reported having had sexual intercourse in the past six months, 7.0% reported having had only same sex partners, and 6.0% reported having had partners of both sexes in this time period.[14]

- In the SurvIDU study, 13.0% of male subjects report same sex partners in the past six months with few reporting consistent condom use.[15]

Protective Behaviour Changes or Higher Risk Practices Following an HIV Positive Test?

More research is needed to determine whether IDU continue to engage in high risk behaviours or modify their behaviours after receiving a positive HIV-antibody test:

- Among IDU in a Quebec study, 53.9% of HIV-positive drug injectors had stopped sharing needles compared to 35.9% of their HIV-negative counterparts in the six months following their HIV serostatus result. However, 18.2% of HIV-positive IDU compared to 6.4% of their non-infected peers began sharing needles with HIV-positive partners in this same time period.[16]

- In a study of IDU in Vancouver, 35.0% of subjects who were HIV-positive reported that they borrowed needles prior to learning about their serostatus. In the months following their HIV-positive test, only 21.0% of these subjects reported that they continued to borrow needles. Similarly, 37.0% of HIV-positive IDU reported needle lending prior to their positive HIV test; whereas, only 21.0% of these subjects continued this practice after receiving their positive test results.[17]

Injecting Drug Use Is a Problem Among Street Youth and Inmates

Appropriate and accessible HIV prevention programs for drug injecting street-involved youth and inmates are clearly needed:

- Results from an ongoing study of Montreal street youth show that one-third of the sample had injected drugs in the previous six months. A total of 58.2% of injectors had borrowed a used needle at least once, and 67.5% had borrowed other injection materials. Almost 8.0% of injectors reported borrowing a used needle from an HIV-infected person.[18]

- Among female inmates in a Quebec prison, 38.0% reported injecting drugs before they were incarcerated, and about half of these women had shared needles. Of those who reported drug injection before going to prison, 11.0% admitted to injecting drugs during their incarceration, and most (80.0%) shared needles.[19]

- Among male inmates in this same study, 26.0% reported that they had injected drugs before being incarcerated, and about half of

these had shared needles. Of those who admitted to injecting drugs outside prison, 2.0% reported injection drug use during their incarceration, and most (92.0%) shared needles.[19]

Comment

Although several ongoing regional studies in Canada collect risk behaviour data on injecting drug users and a large number of one-time, cross-sectional surveys on risk-taking among IDU have been conducted, it is challenging, if not impossible, to compare levels of risk behaviours between data sets. In addition to disparities across study methodologies, different researchers have collected risk behaviour data using different questions or differently worded questions, different variable or concept definitions, different time frames for reported behaviours, and different response categories. It is therefore currently difficult to use available IDU risk behaviour information to identify trends or to help evaluate the effectiveness of prevention programs and policies at more than the regional or local level.

In addition, although the national HIV estimates for 1999 showed a drop in the number of new infections attributed to injecting drug use in that year, the relative lack of behavioural trend data hinder the reliable interpretation of this finding. At this stage in the HIV epidemic in Canada, the need for ongoing monitoring of risk behaviours among IDU populations from across the country is critical. The tracking of injecting and sexual risk behaviours over time would provide important trend data that could be used to inform prevention program design and would help evaluate program effectiveness. Such behavioural data could also be used to interpret changes in HIV prevalence and incidence among IDUs and would serve as an early warning system for HIV spread in this population. Behavioural surveillance of key sub-groups of IDU, namely street-involved youth and inmates, are also critical to formulating an appropriate response to the evolving HIV epidemic among IDU in Canada. Risk behaviour surveillance is a priority for the Centre for Infectious Disease Prevention and Control (CIDPC), Health Canada, and the Division of HIV/AIDS Epidemiology and Surveillance is currently developing systems to monitor risk behaviours among IDU and MSM populations across Canada. In addition, the Division of Sexual Health Promotion and STD Prevention and Control, CIDPC, is currently implementing Phase III of its project on enhanced surveillance of Canadian street youth.

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April 2002

HIV/AIDS
EPI UPDATE
Centre for the Infectious Disease Prevention and Control

At a Glance

- **Unprotected oral sex has been associated with HIV infection in some studies.**
- **The actual risk of HIV transmission through oral sex is difficult to assess since research subjects may under-report higher risk sexual activities.**
- **Poor oral health increases the risk of HIV transmission from oral sex.**
- **Safer sex practices should consider oral sex, particularly unprotected receptive fellatio with ejaculation, as a potential risk behaviour for HIV transmission.**

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Oral Sex and the Risk of HIV Transmission

Introduction

The risk of HIV transmission through unprotected anal and vaginal intercourse is well known. Estimates of the per-sex-act probability of HIV transmission among homosexual men in the U.S. through receptive penile-anal intercourse with ejaculation range from 0.005-0.03 during the asymptomatic phase of infection[1] to as high as 0.1-0.3 during primary HIV infection.[2] Analyses of data from North American and European studies of long-term heterosexual couples estimate the per-sex-act probability of HIV transmission through penile-vaginal intercourse to be approximately 0.001.[3] However, the independent risk of HIV transmission through orogenital contact has been more difficult to study and is less well understood. This report updates current information on oral sex and the risk of HIV transmission. Current recommendations on the use of condoms for oral intercourse are also reviewed.

Laboratory and Animal Studies: Evidence Links HIV Infection to Oral Intercourse in Humans

- A recent animal study found that the minimal dose of simian immunodeficiency virus (SIV) (a virus closely related to HIV-1) required to achieve infection in adult rhesus monkeys through oral exposure was 6,000 times lower than was the minimal dose needed to achieve infection after rectal exposure. The researchers concluded that as with oral exposure to SIV by rhesus monkeys, oral exposure to HIV-1 by humans likely carries the risk of infection.[4]

- In a laboratory study designed to explore the oral transmission of HIV by seminal fluid and colostrum, normal donor samples of human milk, colostrum, seminal fluid, and blood were separately combined with samples of saliva and HIV-infected white blood cells. All samples, in normal physiologic volumes, prevented saliva from inactivating the HIV infected blood cells, leading the researchers to conclude that successful oral transmission of HIV by seminal fluid, milk, and colostrum may occur.[5]

Oral Sex Between Homosexual Males: Not as Safe as once Perceived

Several epidemiological studies have examined the risk of HIV infection through unprotected receptive oral intercourse (receptive fellatio):

- In a 1996-1999 study of homosexual men recently diagnosed with HIV infection, it was found that 7.8% of subjects (eight of 102) were probably infected through receptive oral sex. [6]

- In a 1986-1988 prospective study of HIV infection and AIDS among homosexual men in the Netherlands, four of 102 cases of seroconversion (3.9%) likely occurred as a result of receptive oral intercourse.[7]

- In a 1990-1992 study of newly diagnosed HIV- infected gay men, six of 37 patients who had been infected within a year before testing claimed only receptive oral sex as the possible route of their infection.[8]

Several studies have also explored the possibility of HIV transmission through unprotected insertive orogenital intercourse (insertive fellatio) or insertive oral-anal sex (insertive anilingus):

- In a prospective study of HIV infection among homosexual men in the Netherlands, five of 102 seroconverters (4.9%) may have been infected through insertive orogenital or oral-anal intercourse.[7]

- In an early cohort study of homosexual men, two of five cases of HIV seroconversion were attributed to insertive orogenital sex.[9]

Additional reports or studies, while not distinguishing the type of oral sex between homosexual men, further suggest the possibility of HIV transmission through oral-penile/oral-anal contact:

- In the UK, 13 cases of HIV transmission through oro-genital contact had been reported to the public health authorities up to December 1998. In two of these cases, the reporting physician was not convinced that oro-geniral contact was the only risk.[10]

- In a study to describe the clinical and epidemiologic features of primary HIV infection, four of 46 patients reported having had only unprotected orogenital contact during the suspected sexual encounter that led to their seroconversion.[11]

- In a study of 741 homosexual men in the Netherlands, orogenital contact was identified as an independent risk for HIV acquisition, although this result was not statistically significant.[12]

- In a U.S. study, homosexual males who were participating in a hepatitis B study were found to have a higher risk of HIV infection from both orogenital and oroanal contact.[13]

- In the Omega cohort in Quebec, eight out of the 810 MSM participants were HIV positive at their baseline interview. Three of these men reported only unprotected oral sex as the possible route of their infection.[14]

Prevalence of Oral Sex among Homosexual Males

- The Omega cohort study in Quebec examined the prevalence of unprotected oral sex among MSM by the HIV serostatus of their partners. Researchers found rates for unprotected oral sex of 94% with a

seronegative regular partner, 91% with a regular partner of unknown serostatus, and 88% with a seropositive regular partner. For casual partners the rates were 92% with unknown or seronegative partners and 73% with seropositive partners.[15]

Female-to-Female Transmission of HIV through Oral Intercourse: Truth or Bias?

- To date, there have been several reports of HIV transmission through orogenital contact between lesbians (cunnilingus).[16] A number of researchers have suggested, however, that bisexual activity may be under-reported by gay women, and therefore that not all of the cases of female-to-female transmission of HIV infection are authentic.[17]

Possible Transmission of HIV between Heterosexual Partners as a Result of Oral Intercourse

- There are several reported cases in the literature of women who acquired HIV infection after performing oral sex on their seropositive male partner (receptive fellatio).[18]

- Cases of infection in men following oral sex with their female partners have been reported, including one in which a man was apparently infected via fellatio involving a prostitute.[19,20]

Potential Co-Factors for HIV Transmission during Oral Sex

Saliva that does not contain blood presents no potential for transmission, as research has shown that an enzyme in saliva inhibits HIV. In general, the mouth and throat are well defended against HIV: the oral mucosal lining contains few cells that are the most susceptible to HIV.[21]

Case reports identify factors potentially associated with increased risk of HIV transmission through oral sex: oral trauma, sores, inflammation, concomitant sexually transmitted infections, ejaculation in the mouth, and systemic immune suppression.[22] For receptive fellatio, poor oral health and taking ejaculate in the mouth is a hazardous combination that increases the risk of HIV transmission. [23]

- In a 1996 cross-sectional study of crack cocaine smokers, oral lesions were associated with HIV infection among persons who reported receptive oral sex.[24]

- A 1993 study of female sex trade workers found that crack users who inconsistently used condoms when performing oral sex on their clients were more likely to be infected with HIV than were those who consistently used condoms when performing fellatio.[25]

- Of the eight homosexual men in the Options Project who may have acquired their HIV infection through receptive oral intercourse, three reported oral problems, including occasional bleeding gums.[6]

Oral Sex and "Safer Sex Counselling": Existing Views and Recommendations

- The Canadian AIDS Society (CAS) currently classifies insertive fellatio between men, or between women and men, as having a negligible risk of HIV transmission regardless of condom use. Receptive fellatio between men, or between men and women, is classified as having negligible risk if a condom is used and as low risk if a condom is not used (whether or not semen is taken in the mouth). CAS presently cautions that the risk of transmission from receptive fellatio is increased if lesions or sores are present in the mouth.[26]

- With respect to insertive cunnilingus between men and women or between two women, CAS regards this practice as having a negligible risk of HIV transmission if a

barrier is used, and as low risk if no barrier is used (regardless of menstrual status). Receptive cunnilingus between men and women or between two women is regarded as having a negligible HIV risk.[26]

- Both insertive and receptive anilingus, with or without a barrier, between partners of the same sex or opposite sex, are viewed by CAS as having a negligible risk of HIV transmission.[26]

- CAS emphasizes that the risk of transmission of HIV (or other STDs) from any of these types of oral intercourse can be effectively reduced by the proper use of a latex barrier (condom or dental dam), and thus advocates the avoidance of unprotected orogenital or oroanal contact.[26]

Conclusions

The risk of HIV transmission through oral sex is difficult to assess due to the fact that HIV seroconverters may under-report other higher risk sexual practices. A literature review identified exposure to HIV through unprotected oral intercourse as an independent risk factor for HIV acquisition in only three (12.5%) of 24 epidemiological studies designed to examine risk of HIV from different sexual exposures.[27] It indicates that the importance of oral sex to HIV transmission is a complex result of the relative frequency of oral sex (among other activities), the infectivity of oral secretions and its modification by oral pathology, and the resistance to infection by inhibitory substances in saliva.[27] Also, the HIV incidence and prevalence in the community, the role of the antiretroviral therapy and the extent to which personal prophylaxis is adopted will influence the contribution of oral sex to HIV transmission.[27]

While oral sex is a lower risk activity than unprotected anal or vaginal intercourse, repeated exposures may increase the risk. Safer sex practices should consider oral sex, particularly unprotected receptive fellatio with ejaculation, as a potential risk behaviour for HIV transmission.

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HIV/AIDS
EPI UPDATE
Centre for the Infectious Disease Prevention and Control

At a Glance

- **The Canadian Strain and Drug Resistance Program (CHSDRSP) is a national surveillance program to monitor HIV strain diversity in the country.**
- **Although HIV-1 subtype B continues to predominate, subtypes A, C, D, and the circulating recombinants A/E, A/B, and A/G have been identified in Canada.**
- **The overall prevalence of non-B HIV-1 subtypes in Canada is 7.8%.**
- **Prevalence of non-B HIV-1 subtypes in Canada varies between geographic regions and may be related to travel and/or migration from countries where divergent HIV strains predominate.**

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HIV-1 Strain Surveillance in Canada

Introduction

Two types of HIV have been characterized in humans, HIV-1 and HIV-2, and both HIV-1 and HIV-2 can lead to AIDS. HIV-2 is less common than HIV-1 and is mainly found in West Africa. HIV-1 can be divided into three major phylogenetic groups: "M" (major), "O" (outlier) and "N" (new).[1] The vast majority of isolates cluster in the "M" group. Based on sequencing the viral genes *env* and *gag*, ten different subtypes (A-D, F1, F2, G, H, J, and K) have been identified within this group. However, not all subtypes within Group "M" are 'pure' since the recombinants or 'mixed' subtypes A/B, A/E, and A/G, have also been detected.[2] Of note, there continues to be a debate over the classification of the A/E recombinant. The nomenclature suggests this recombinant is a mosaic of subtypes A and E, however a 'pure' subtype E has not yet been found. The recombinant A/E has also been referred to as subtype E by some researchers. Subtypes A and C are the most common, accounting for about one-half of HIV-1 infections world-wide. In Canada, the United States and Western Europe, HIV-1 subtype B predominates. However, due to travel and migration, non-B subtypes are increasingly being reported in these parts of the world. This *Epi Update* provides a summary of the surveillance of HIV strains in Canada and the prevalence of divergent HIV strains in Canada, the United States, and Western Europe.

Why conduct HIV strain surveillance?

The Canadian HIV Strain and Drug Resistance Surveillance Program (CHSDRSP) was initiated as an integrated group of projects aimed at enhancing the national surveillance of HIV. Through a collaborative approach between the provinces, territories, and Health Canada, laboratory samples (serum from newly diagnosed HIV-positive individuals) and

corresponding epidemiological data are sent from the Provincial Health Laboratories to Health Canada. The results are shared with key stakeholders including the provinces and territories, when completed. One of the central goals of this program is to conduct the systematic surveillance of HIV subtypes in Canada in order to attain the following four main objectives:

1) ***Improve HIV diagnostics and screening strategies***

The broad genetic diversity of HIV has implications for the ability of diagnostic tests to reliably detect circulating HIV strains[3]. The sentinel arm of CHSDRSP, through the reference services of the National HIV Laboratories at Health Canada, addresses this goal by testing samples with unusual serological, PCR, or other virological test results, that are provided by the provincial health laboratories. Based on the knowledge of circulating HIV strains, modifications can be made in current tests to ensure that all HIV positive persons are detected upon testing. This is also relevant for ensuring the safety of the blood supply since the tests used for screening donated blood must be able to detect circulating HIV variants.

2) ***Inform vaccine development***

It is important to know the distribution of the viral subtypes and intrasubtype variation to target vaccine development and testing since the efficacy and effectiveness of vaccines may be subtype-specific.[3]

3) ***Assess HIV transmission patterns***

Although genetic analyses have been used to assess the spread of HIV globally[4], there is little consensus on whether subtype differences in HIV affect transmission rates[5-8]. Some studies note differences in the biological properties of HIV-1 subtypes,[9-11] however, this needs to be confirmed. Knowing the distribution of HIV variants in Canada, along with corresponding epidemiological factors, will help to assess the implications of any differences in transmissibility. The public health implications of such findings, including prevention and treatment strategies, are of special interest.

4) ***Assess HIV pathogenesis and progression of HIV-related diseases***

Although the rate of HIV-related disease progression is affected by many factors including host factors, the evidence suggests that the immunologic responses may be less suppressed by HIV-2 than by HIV-1.[12,13] And whereas some studies suggest genetic subtypes play a role in disease progression, other studies suggest the reverse. Many of these studies are reviewed by Hu **et al**.[3] The relationship between the genetic aspects of HIV and disease pathogenesis needs further investigation.

Distribution of HIV-1 subtypes

Canada

- Results from CHSDRSP show that 7.8% of the sampled population (n=1167) were infected with non-B subtypes (See Table 1 for subtype distribution)[14]

Table 1: Distribution of HIV-1 Subtypes

Subtype	Frequency	Percent
A	25	2.1
A/B	1	0.1
A/C	1	0.1
A/E*	5	0.4
A/G	3	0.3
B	1076	92.2
C	52	4.5
D	4	0.3
Total	1167	100

*The recombinant A/E has also been referred to as subtype E
Source: Division of HIV/AIDS Epidemiology and Surveillance, CIDPC, PPHB, Health Canada

- Preliminary results from CHSDRSP suggest a significant proportion of individuals infected with a non-B HIV-1 subtype are of African or Asian origin, and/or identify heterosexual sex as their primary risk factor.[14] These correlations are likely due to travel and migration from endemic areas where divergent HIV-1 subtypes predominate and where heterosexual sex is a major risk factor for HIV-1 infection.

- A 1995 publication describes the first report of HIV-1 subtype A in Canada in an African born male who moved to Canada in 1983.[15]

- The BC Centre for Excellence in HIV/AIDS has conducted genetic analyses of HIV linked to cohort studies and to the BC HIV drug treatment program. These studies suggest that non-B subtypes in BC represent at least 4% of HIV infections among individuals starting therapy.[16] HIV-1 subtypes A, C, and D have been identified.

- HIV-2 was detected in Canada as early as 1988[17] and, and the systematic surveillance of HIV subtypes includes surveillance for HIV-2.

Existing studies on high-risk populations confirm that HIV-1 subtype B is the most common subtype found in the country.

- In 1998, serological samples from 31 HIV positive persons of both genders, representing approximately 25% of known HIV positive persons in Newfoundland, were all of HIV-1 subtype B.[18]

- In 1999, all HIV-1 sequences analysed among infected injection drug users (n=17) and men who have sex with men (n=5) residing in Montreal[19] were of subtype B.

- As of November 2000, all samples of 31 recent seroconverters in the POLARIS cohort in Ontario are of subtype B.[20]

United States

- As early as 1993, subtype D was reported in the United States.[21]

- Results from CDC's ongoing sentinel surveillance of strain and drug resistance has found 1.6% of persons newly diagnosed with HIV were infected with subtype A (n = 321).[22]

- A prospective study conducted in 1998, found 12% of recent military seroconverters were infected with the non-B HIV-1 subtypes (8% A/E, 4% B/F, n=76). All but one of these individuals reported heterosexual contact with someone outside the U.S. during their seroconversion window period.[23]

- In another cohort study of 88 treatment-naive individuals presenting to a Boston hospital in 1999, nine (10%) were infected with non-B HIV-1 (subtypes A and C, and the recombinants A/E and A/G). All these individuals were born outside the United States.[24]

- In a population-based study of people with HIV or AIDS, identified as at increased risk for group O infection based on country of birth (n = 155), 2 cases of Group "O" infection and 27 cases of non-B, group M infection were identified. Both cases of Group "O" infections were identified in individuals born in Africa.[25]

Western Europe

- Rising prevalence of HIV-1 non-B subtypes has been reported in some Western European countries, and most of these infections could attributed to countries where non-B HIV subtypes predominate. Many of these studies are reviewed by Thomson and Najera.[26]

- Group O HIV, which is most commonly found West Africa, has been identified in Western Europe including countries such as Norway,[27] Spain,[28] and France.[29]

- Recombinant strains of HIV-1 have also been detected in countries including the UK,[30] Spain,[31] and Greece.[32]

Comment

The introduction of variant HIV strains into Canada will invariably challenge existing diagnostic tests and interpretation algorithms. Depending on the impact that subtypes have on vaccine effectiveness and efficacy, it may direct the course of future vaccine research and testing. And, depending on future findings related to subtype-specific transmissibility, pathogenicity and treatment, it may play a role in changing the nature of the HIV epidemic in Canada. It is therefore important to implement the systematic

collection and analysis of data related to strain surveillance across Canada.

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April 2002

HIV/AIDS
EPI UPDATE
Centre for the Infectious Disease Prevention and Control

At a Glance

- **The Canadian HIV Strain and Drug Resistance Program conducts national surveillance for primary drug resistance.**
- **Preliminary observations on the prevalence of HIV-1 primary drug resistance in Canada suggest:**
  - **The overall prevalence of primary resistance, to at least one anti-retroviral drug, is between 4.5-20%.**
  - **Multi-drug primary resistance has been observed, with an overall prevalence of between 0.2-9.9%.**
- **Prevalence of HIV-1 primary drug resistance in Western Europe and the United States ranges from 2.1-25.8%.**

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Primary HIV Anti-retroviral Drug Resistance in Canada

Introduction

While drug resistance among individuals on treatment (secondary drug resistance) is well documented, resistance seen in treatment- naive individuals, presumably due to the transmission of a drug-resistant variant of HIV-1 (primary drug resistance), is less well studied. This *Epi Update* provides a summary of how drug resistance arises, how drug resistance is identified, and key studies on the prevalence of primary drug resistance in countries where highly-active anti-retroviral therapy (HAART) is widely used.

Why conduct primary drug resistance surveillance?

Although HAART has led to a reduction in HIV-1 related morbidity and mortality in Canada and some other countries, there is a concern that its widespread use, increased number of treatment failures, and continuing risk behaviour may result in increased transmission of drug-resistant virus. The first case of primary drug resistance was reported in 1993 with the transmission of a zidovudine-resistant HIV-1 strain.[1] Since then many reports of transmission of drug resistant HIV strains have been published. [For an overview of these studies see a review by Wainberg & Friedland (1998)[2]].

What is less well understood is the prevalence of primary drug resistance and the variation of this prevalence over time, geographic area and population risk group. The Canadian HIV Strain and Drug Resistance Surveillance Program (CHSDRSP) aims to address these questions and the resulting information can be used to develop guidelines for initial therapeutic regimens and to develop more effective HIV prevention strategies, including the prevention of vertical transmission.

Evolution of drug resistance

Viral resistance develops largely due to mutations in the genes encoding the HIV reverse transcriptase (RT) and protease enzymes. Both these enzymes are required for viral reproduction and current anti-retroviral drugs interact with these enzymes to impede their activity. Current drugs include nucleoside reverse transcriptase inhibitors (NRTIs), non-nucleoside reverse transcriptase inhibitors (NNRTIs), the nucleotide reverse transcriptase inhibitor, Tenofovir, and protease inhibitors (PIs). Mutations in the genes encoding RT and protease can alter these enzymes so as to diminish this interaction and undermine the ability of the drugs to impede viral replication.

Mutations in HIV virus are largely a result of rapid replication (in an established infection, an estimated 10 billion virions are produced per day[3]) and the error-prone activity of RT (estimated to introduce an average of one nucleotide substitution each time the virus replicates[4]). Most mutations are lethal or neutral and the wild type strain usually dominates because it replicates more efficiently.[5] However recent studies suggest that virus with certain mutations can persist and establish infections despite their replicative disadvantage.[6,7] In general, it is possible for every single drug-resistant mutation to be generated daily.[8] Under conditions where treatment does not completely inhibit viral replication, virus harbouring drug resistant mutations can be selected and can proliferate resulting in treatment failure[8]. In the case of primary drug resistance, drugs that permit the growth of existing resistant strains will fail. For some drugs, a single mutation is associated with a high level of drug resistance. For example, the replacement of methionine to valine at position 184 of RT (M184V) is associated with resistance to 3TC (lamivudine). For other drugs (ex: most PIs), a combination of secondary mutations is required.[8]

Methods to identify drug resistance

Genotypic tests identify mutations in the viral genome through commercially available probes for particular mutations or via sequencing viral genes of interest. Resistance is identified by comparing the generated sequences to databases containing algorithms to assess resistance-conferring mutations.

Phenotypic tests determine the enzymatic activity of viral genes or assess viral growth in increasing concentrations of drugs. Resistance is usually defined when, compared to the wild type strain, four or more times the amount of drug is required to inhibit viral growth by 50%. This test is similar in concept to antibiotic resistance testing in bacterial culture.

Note: *Genotypic and phenotypic testing and interpretation are evolving fields that are extremely complex, requiring expert inputs.* For a review of a current list of mutations that are associated with drug susceptibilities see D'Aquila *et al* (2001).[9] Similar listings are also available at http://hivdb.stanford.edu/.

Summary of Key Studies on the Prevalence of Primary Drug Resistance

It is difficult to make inter-study comparisons and arrive at firm conclusions because of differences in study design including study populations, types of resistance testing used, and mutations studied and reported. However, the following general trends appear to be emerging in Canada:

1) Results from cohort and cross-sectional studies suggest that in Canada, the overall prevalence of primary resistance to at least one anti-retroviral drug is between 4.6-20% (Table 1, columns 6-7).

2) Multi-drug primary resistance has been observed in Canada, and preliminary studies suggest an overall prevalence of between 0.2-9.9% (Table 1, column 8).

Table 1: Summary of key studies on HIV-1 primary drug resistance in Canada

Province	Year	Study Population[a,d]	Clinical Status[d]	Sample size	RTIs[b] %	PIs[b] %	MDR[b] %	Total[c]
BC[10]	'97-'98	mixed RF	ND	423	4.6 (n=416)	4.6		
QC[11]	'97-'99	IDU (26%) Sexual (69%)	RHI	81	20	6	9.9	
ON12	'97-'99	MSM	RHI	23	13			
BC, AB, SK, MB[13]	'97	MSM (44%) IDU (39%) Heterosexual (16%)	RHI/ND	19	0	0	0	0
BC, AB, SK, MB[13]	'98	MSM (37%) IDU (39%) Heterosexual (11%)	RHI/ND	46	8.7	0	0	8.7
BC, AB, SK, MB[13]	'99	MSM (31%) IDU (25%) Heterosexual (25%)	RHI/ND	110	8.1	4.5	0	12.7
BC, AB, SK, MB[13]	'00	MSM (21%) IDU (27%) Heterosexual (11%)	RHI/ND	480	3.3	1	0.2	4.5
BC, AB, SK, MB[13]	Jan-Mar '01	MSM (35%) IDU (21%) Heterosexual (7%)	RHI/ND	43	4.6	2.3	0	6.9
QC14	'99-'00		RHI	61		6.5	3.2	26

a Reported proportions may not add to 100% since risk factors are complete for all individuals in the study population
b Only mutations associated with a high level of drug resistance are identified
c Total may include mutations associated with high levels of drug resistance as well as secondary drug resistance mutations seen in the same individual
d Refer to "Key to Abbreviations" section for explanation of acronyms

In Western Europe and the United States, the following trends seem to be emerging:

1) Between 1997-1999 in Spain and Switzerland, the prevalence of primary drug resistance seems to be decreasing (Table 2, rows 7 and 8-10, columns 6-7 and 9). However, further data are needed to confirm this trend and to understand the factors affecting the trend .

2) Between 1994-2000 in the UK, the prevalence of drug resistant HIV-1 seems to be increasing (Table 2, rows 11-13, columns 6-7 and 9). However the sample size is small (n=69) and more data is required to confirm this trend. In the U.S. among 3 cities participating in a CDC-sponsored study, prevalence of primary drug resistance increased between 1998 to 1999 but did not change significantly between 1999 to 2000 (Table 2, row 17, columns 6-7 and 9).

3) Mother-to-child transmission of zidovudine, nevirapine, or multi-drug resistant HIV-1 has been reported in the U.S. and in France.[27, 28]

Table 2: Summary of key studies on HIV-1 primary drug resistance in Western Europe and in the United States

Country	Year	Study Population[1]	Clinical Status[d]	Sample size	RTIs[2,3] %	PIs[2] %	MDR[2] %	Total[4]
France[15, 16, 17]	'95-'98	mixed RF	RHI	48	16.6	2		
	'99	MSM/BI (71%)	RHI	108	6.5 (NRTI) 3.7(NNRTI)	3	0.9	
	'00	MSM/BI (55%) Hetero (37%)	RHI	98	8 (NRTI) 5 (NNRTI)	6	5	11
Italy[18]	'96-'98	mixed RF	RHI	68	16.2	6	4.4	
Spain[19, 20]	'98	mixed RF	RHI	126	17 (NRTI) (n=52)	6		
	'97-'99 '00-'01	mixed RF mixed RF	RHI RHI	31 21	16.1 0	9.7 4.8	0 0	25.8 4.8
Switzerland[21]	'96	MSM (29%) Hetero (54%)	RHI	35	5.6	3		8.6
	'97	MSM (56%) Hetero (37%)	RHI	41	10	7.7		14.6
	'98	MSM (45%) Hetero (33%)	RHI	60	7.1	2		8.8
	'99	MSM (38%) Hetero (46%)	RHI	61	3.4	1.9		5
UK[22]	'94-'96	mixed RF	RHI	21	0	0	0	0
	'97-'99	mixed RF	RHI	22	13.6	0	0	13.6
	'00	mixed RF	RHI	26	19.2	3.8	0	23
USA[23, 24, 25,26]	'89-'98	MSM (80%)	RHI	141	0.7 (NNRTI)	1.4	1.4	2.1
	'95-'99	MSM (94%)	RHI	80	12.5 (NRTI) 7.5 (NNRTI)	3	3.8	16.3
	'97-'98		RHI	114	4 (NRTI) 15 (NNRTI, n=95)	10	5	22
	'98	mixed RF	RHI	238	3.8 (NRTI) 0.4 (NNRTI)	0	0	3.8
	'99	mixed RF	RHI	240	8.3 (NRTI) 2.1 (NNRTI)	1.7	1.7	10
	'00	mixed RF	RHI	245	6.9 (NRTI) 1.2 (NNRTI)	2	1.2	9

1 Only the top two risk factors are included . Mixed risk factor indicates exact distribution of risk factors was not available
2 Only mutations associated with a high level of drug resistance are identified
3 Information on NRTI and NNRTI provided when total RTI is was not available
4 Includes mutations associated with high levels of drug resistance and secondary drug resistance mutations

Key to abbreviations

Province: BC=British Columbia, QC=Quebec, AB=Alberta, SK=Saskatchewan, MB=Manitoba
Study Population: RF=risk factors, IDU=injecting drug user, MSM=men who have sex with men, BI=bisexual
Clinical Status: ND=date of infection not determined, RHI=recent HIV-1 infection (within the past 6-18 months)
RTIs=reverse transcriptase inhibitors
PIs=protease inhibitors
MDR=multi-drug resistance

Comments

The prevalence of primary HIV drug resistance appears to be becoming more widespread in most countries where HAART is used. Although the interpretation of results is difficult and evolving, persons infected with drug resistant variants of HIV may be at increased risk of drug failure despite being therapy-naïve. Surveillance of primary drug resistance is needed not only to develop guidelines for initial therapy, but also to better understand and prevent the transmission of resistant variants.

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HIV/AIDS
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At a Glance

- **Nonoxynol-9 should not be promoted as an effective means of HIV prevention.**
- **Recent data indicate that Nonoxynol-9 does not reduce the risk of HIV transmission and may in fact increase the risk.**
- **Development of an effective anti-HIV microbicide is a public health priority.**

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Nonoxynol-9 and the Risk of HIV Transmission

Introduction

The purpose of this *Epi Update* is to summarize recent data on the effectiveness of nonoxynol-9 as a microbicide, with particular reference to its effect on HIV transmission. While the effectiveness of nonoxynol-9 as a spermicide is well known, its usefulness as a microbicide is less clear, and in fact recent data indicate that nonoxynol-9 may actually increase the risk of HIV transmission. This *Epi Update* examines the implications of these data in the context of HIV prevention efforts.

Background

Microbicides are chemical substances that kill viruses and bacteria, and they have the potential to reduce the transmission of HIV and other sexually transmitted pathogens when applied vaginally or rectally before sexual intercourse. The development of an effective microbicide is an important research objective since it would not only improve the effectiveness of condoms in preventing disease transmission, but more importantly would offer an alternative for women to protect themselves without having to obtain the cooperation of their male sexual partner (in contrast to the male condom). Such an alternative would be especially welcome since the vast majority of global HIV transmissions occur via heterosexual activity.

An "ideal" microbicidal product would be effective against multiple STDs, including HIV, safe to use several times daily, fast acting, acceptable to users, affordable, colorless, odorless, easy to store and to use, easy to obtain, and available in a variety of preparations, including with or without a

contraceptive component. None of the compounds currently in development meet those ideal standards and experts say it is unlikely that any one product will meet them all. The immediate priority is to develop a microbicidal product that would provide protection against HIV.[1]

Nonoxynol-9 (N-9) is one of the best studied candidate microbicides for the prevention of HIV and other sexually transmitted infections. N-9 was initially developed as a spermicide, a chemical that kills sperm and therefore prevents pregnancy. These chemicals are used in contraceptive spermicide products and as complementary components in the lubricant of barrier methods of contraception, such as the male condom. Studies have demonstrated that when spermicides are used alone, they are 75-85% effective in preventing pregnancy.[2,3] In addition, N-9 has also been identified as a compound that can kill viruses and bacteria, and so has been proposed as a candidate microbicide for HIV prevention. Laboratory studies have shown that N-9 kills or stops the growth of the HIV virus as well as the pathogens of other sexually transmitted infections such as genital herpes, gonorrhea, syphilis, trichomoniasis and chlamydia.[4]

A number of products containing N-9 are licenced for use as spermicides in both the United States and Canada. These products are available without a prescription and come in a variety of forms, including creams, films, foams, gels, suppositories, and as a lubricant on spermicidal condoms. In Canada, N-9 is found as a component of the following contraceptive products: Advantage 24 contraceptive gel, Delfen foam, vaginal contraceptive film (VCF), KY Plus Jelly spermicidal lubricant, Protectaid contraceptive sponge, and Emko, Encare, Ramses and Durex brands of condoms with spermicide. However, in Canada at present, there are no products with N-9 that are licensed or indicated for use as microbicides.[5]

Evidence Regarding Nonoxynol-9 and HIV Transmission

The frequent use of nonoxynol-9 can induce lesions and ulcerations to genital mucosa, thereby increasing the probability of transmitting infectious agents. [6] Studies have also indicated that these adverse effects of N-9 are dose related, supporting the notion that a potentially narrow margin of safety may exist for N-9.[7]

While laboratory studies clearly indicated that N- 9 could be an effective barrier to HIV, clinical trials in humans have produced mixed results. Several observational studies have indicated that N-9 may reduce the risk of HIV transmission, but the study design did not permit definitive conclusions.[8-10] A meta-analysis investigation that combined data from several studies concluded that N-9 may have a protective effect against both gonorrhea and chlamydia[11], but a recent randomized controlled trial found that N-9 gel did not protect against urogenital gonococcal or chlamydial infection.[12] A recently-published cohort study found no evidence of N-9 protection against HIV,[13] similar to the results of two controlled trials on this subject. One trial found no significant protection but a higher incidence of genital ulcers in the N-9 group compared to the control group,[14] and another trial found increased HIV infections in the N-9 group compared to the control group though this difference was not statistically significant.[15]

The most significant recent data are from two studies presented at the 13th International AIDS Conference in Durban, South Africa in July, 2000. A study sponsored by UNAIDS was presented in which female sex trade workers at high risk for HIV infection were encouraged to use condoms along with a vaginal gel for intercourse. Half of the women used a placebo (inactive or control) gel and the other half used N-9 gel. The result was that the HIV infection rate in the N-9 group was 50% higher than in the control group (15.5 versus 10.2 infections per

100 person-years), and the difference was statistically significant.[16]

Furthermore, infection rates of gonorrhea and chlamydia were also higher in the N-9 group, though these differences were not statistically significant. The likely explanation for the increased HIV infection rate is the higher frequency of genital lesions found in the N-9 group (19% versus 13%).[16] It is worthwhile to note that the group using condoms with N-9 gel had lower HIV infection rates than sex workers not in the study (who had lower overall rates of condom use).

The association between N-9 and genital lesions was also seen in a study of monogamous, low risk women who had a much lower frequency of sexual intercourse than the sex workers in the UNAIDS study. In this second study, women applied a vaginal N-9 gel or a placebo gel twice daily, and the N-9 group had significantly more vaginal itching, burning and mucosal lesions.[17] While it is difficult to extrapolate the findings of these two studies to the general population in terms of sexual frequency and dosage and mode of N-9 use (including the occasional use of an N-9 lubricated condom), the theoretical benefits of N-9 use in such situations would have to be weighed against the demonstrated potential for harmful side effects.

Comment

Taken together, the recent evidence is convincing that frequent use of N-9 does not reduce the risk of infection by HIV, and may in fact increase the risk by causing disruptions and lesions in the genital mucosal lining. There are currently no data available to address the question of whether these results also apply to situations in which the dosage and/or frequency of N-9 use is lower.

To address this question, WHO hosted a meeting on N-9 in late 2001 and the conclusions of this meeting are to be published shortly. Nonetheless, based on data currently available, recommendations on the use of N-9 for HIV prevention may need to be re-evaluated. Health Canada has never recommended N-9 on its own as an effective means of HIV prevention. Current assessment of the data indicates that:

- N-9 should not be promoted as an effective means of HIV prevention. In particular, individuals who cannot use a condom for HIV prevention should not be counseled to use N-9 as an alternative.

- The best STD and HIV barrier is a latex condom without N-9. However, a condom lubricated with N-9 is better than no condom at all. The protection provided by the condom would appear to outweigh the potential risk of the N-9.

- If N-9 is used as an aid to contraception, its benefit should be carefully considered in light of the increased risk of genital lesions and the resulting potential for an increased risk of HIV transmission.

Similar recommendations have been released from the Centers for Disease Control and Prevention in the USA.[18,19]

Future directions

These disappointing data on the ineffectiveness of N-9 as a microbicide serve to further reinforce the importance and urgency of research on the development of other possible compounds as microbicides. Other classes of compounds that show promise include topical non-nucleoside reverse transcriptase inhibitors (such as efavirenz), inhibitors of viral attachment (such as cellulose sulphate), and natural products (such as buffer gels). For individuals who are unable to access condoms or negotiate condom use, particularly women, there is an urgent need to identify safe and effective alternatives in HIV prevention. Thus the development and evaluation of potential and effective microbicides is a public health priority.

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